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ELECTRIC RAILWAY JOURNAL

Volume 45
Number 23
June 5, 1915

McGraw Publishing Co., Inc.

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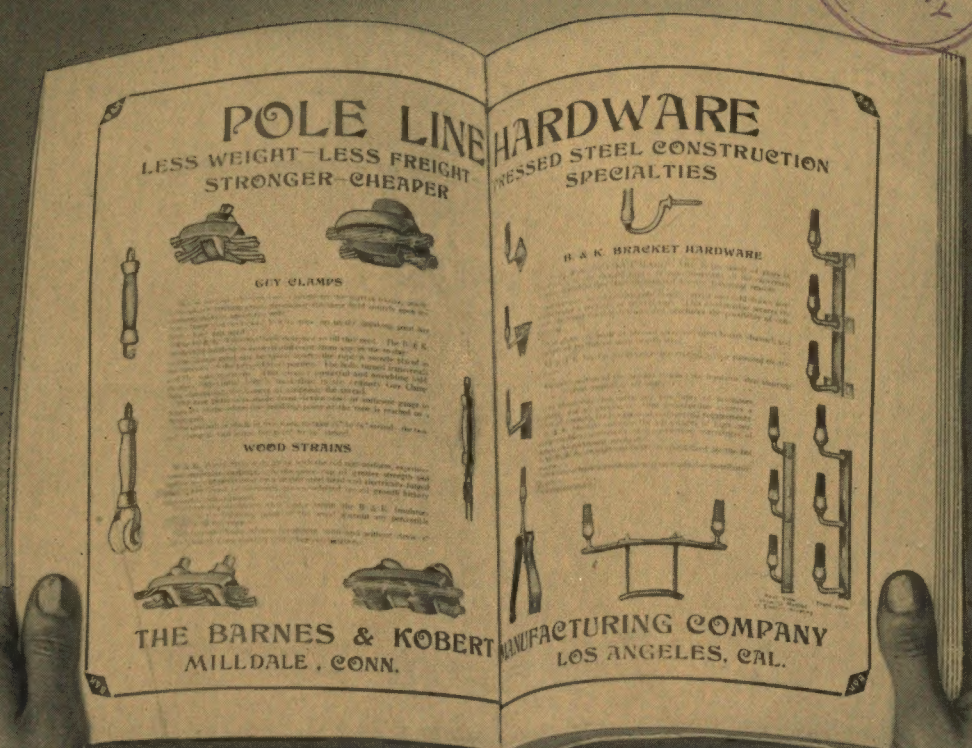
This illustrates the line



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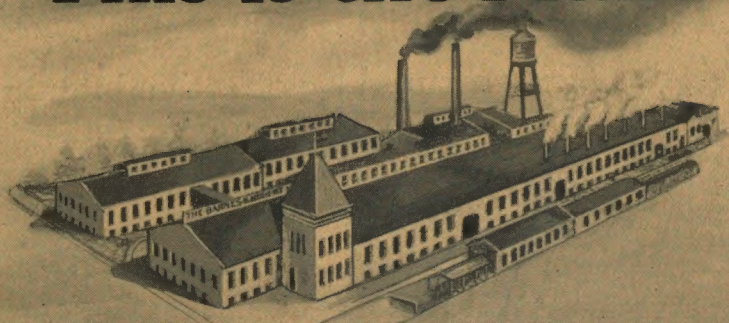


The New B & K Book Is Ready

Seventy-two pages of pressed steel bracket hardware, pole line hardware and construction specialties. The very material you need to cut transportation, installation and maintenance costs. Pressed steel gives strength, lightness, low cost. Write us now for your copy of the B & K book.

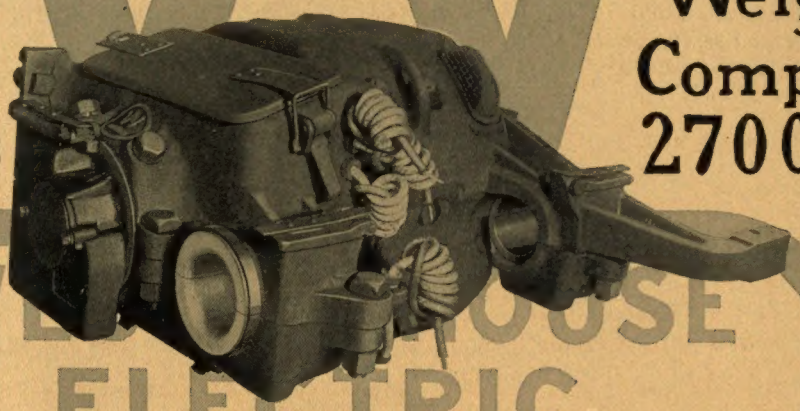
THE BARNES & KOBERT MFG. CO.

Milldale, Conn. Los Angeles, Cal.

No. 307-V

45 HP at 500 Volts
55 HP at 600 Volts

Weight Complete 2700 lbs.



WESTINGHOUSE ELECTRIC

A Splendid Motor

For medium city or light, moderate speed interurban service.

RIGID SPLIT FRAME CONSTRUCTION—provides Railways not equipped with facilities for handling Box types with a thoroughly RELIABLE SPLIT FRAME MOTOR. Modern in detail.

High service capacity secured by effective internal ventilation.

Ask for leaflet No. 3765 giving details.

Westinghouse Electric & Manufacturing Co.

East Pittsburgh, Pa.

Sales Offices in all Large Cities.

Electric Railway Journal

New York, June 5, 1915

Volume XLV No. 23 Pages 1055 to 1098

Contents

The Norfolk & Western Electrification 1058

The first month's service of this important installation has demonstrated the complete success of the single-phase contact system in combination with three-phase locomotives having rotary phase-converters. Train loads of 3250 tons are handled up 2 per cent grades at 14 m.p.h.

ELECTRIC RAILWAY JOURNAL, June 5, 1915. 22 cols. Ill.

Southwestern Association Question Box 1070

Track, shop, distribution, transportation and management topics were covered in symposium form.

ELECTRIC RAILWAY JOURNAL, June 5, 1915. 2 cols.

Convention of Missouri Association 1071

Boat trip on Four Rivers enjoyed. Jitney discussed.

ELECTRIC RAILWAY JOURNAL, June 5, 1915. 1½ cols.

The Chicago, Milwaukee & St. Paul Locomotives 1072

A. H. Armstrong shows that among the interesting features of these new electric locomotives are large motor capacity with axle driven motors, regeneration on down grades and a novel method of current collection.

ELECTRIC RAILWAY JOURNAL, June 5, 1915. 6 cols. Ill.

American Association News 1075

Association headquarters moved this week to No. 8 West Fortieth Street. Chicago Elevated Section holds its second meeting and plans to select representatives to the convention.

ELECTRIC RAILWAY JOURNAL, June 5, 1915. 2 cols.

Communications 1076

Mr. Sprague on Regenerative Control. Investment per Passenger. Traffic Characteristics.

ELECTRIC RAILWAY JOURNAL, June 5, 1915. 4 cols.

Equipment and Its Maintenance 1078

The Tri-City Railway Trouble Board—*By John Sutherland.* Mysterious Derailments—*By R. P. Williams.* Truck Angularity on Curves. Paving Experiences at Joliet—*By John B. Tinnon.* Commutator Soldering Torch—*By J. C. Donovan.* Economical Asphalt Relaying with Hot Mixer. New Form of Cash and Ticket Fare Box. New Trolley Base and Headlight. Non-Splashing Electric Track Switch.

ELECTRIC RAILWAY JOURNAL, June 5, 1915. 14 cols. Ill.

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JAMES H. MCGRAW, President. A. E. CLIFFORD, Secretary. J. T. DE MOTT, Treasurer. H. W. BLAKE, Editor.

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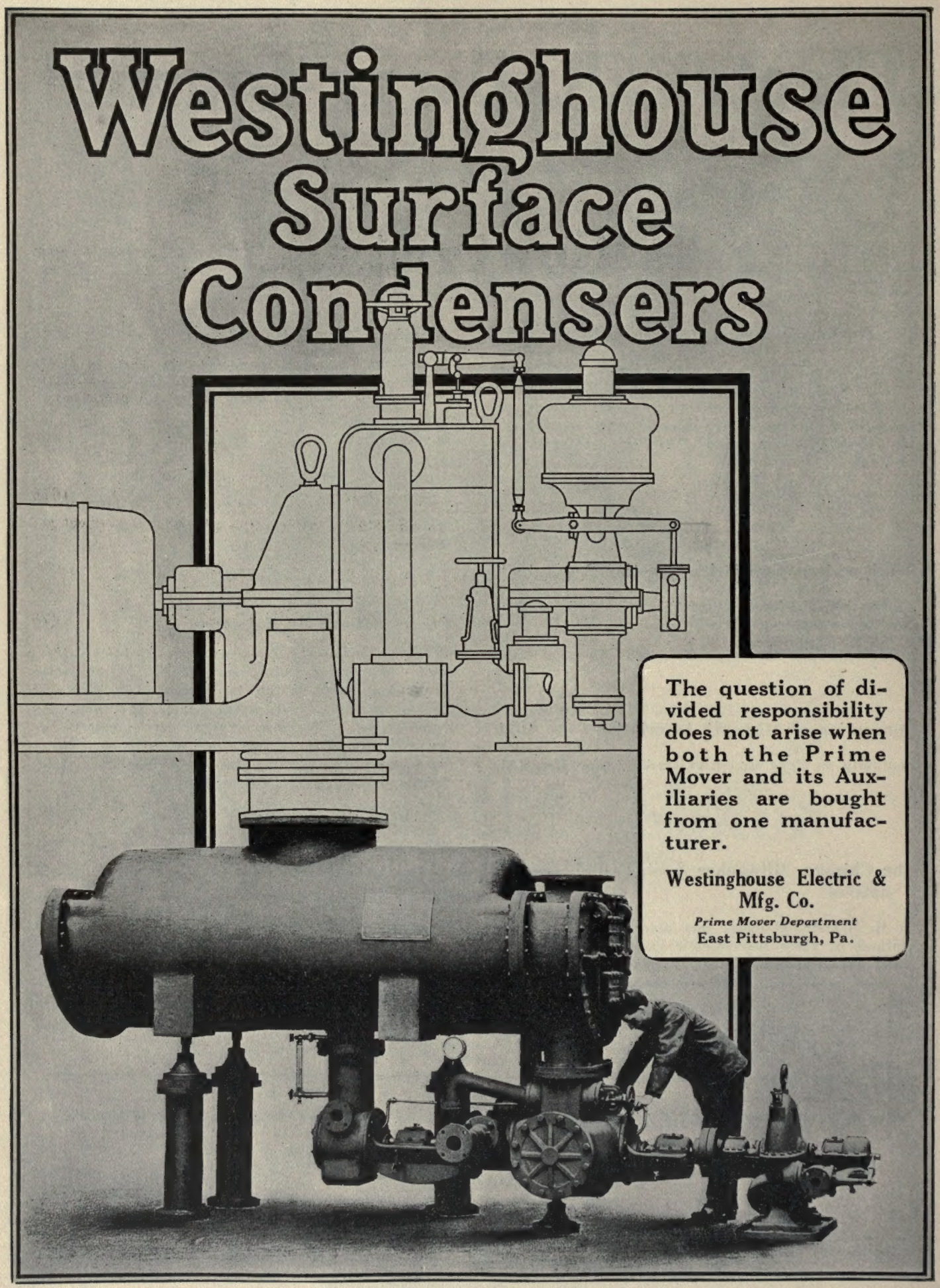

Westinghouse
Surface
Condensers
The question of divided responsibility does not arise when both the Prime Mover and its Auxiliaries are bought from one manufacturer.
Westinghouse Electric & Mfg. Co.
Prime Mover Department
East Pittsburgh, Pa.

INERTIA

(What It Means in Railroad Engineering)

INERTIA IS THE TENDENCY OF A BODY AT REST TO REMAIN AT REST; OR OF A BODY IN MOTION TO CONTINUE IN MOTION.

THE INERTIA OF ANY MOVING TRAIN CAN BE INDICATED IN TERMS OF ENERGY, WHICH IS EQUAL TO ONE-HALF THE MASS MULTIPLIED BY THE SQUARE OF THE VELOCITY, AND USUALLY EXPRESSED IN FOOT POUNDS.

IF A MODERN SIX CAR PASSENGER TRAIN WEIGHS 1,500,000 POUNDS AND ATTAINS A SPEED OF 60 MILES PER HOUR, IT HAS ACCUMULATED OVER ONE HUNDRED AND EIGHTY MILLION FOOT POUNDS OF ENERGY TENDING TO KEEP THAT TRAIN IN MOTION.

INERTIA IS WHAT THE AIR BRAKE IS UP AGAINST. THE CONTROL OF INERTIA OR THE ENERGY OF MOVING TRAINS WAS A MAN'S JOB IN 1870, WHEN AIR BRAKES WERE FIRST APPLIED. TODAY—45 YEARS LATER—THIS PROBLEM—WITH TRANSPORTATION ITSELF—HAS GROWN TO GIANT PROPORTIONS.

WHAT IS THE ANSWER?

MODERN BRAKES CONTROL MODERN TRAINS MORE PERFECTLY AND WITH GREATER SAFETY AND ECONOMY THAN EVER BEFORE IN THE HISTORY OF THE ART.

IF NECESSITY IS THE MOTHER OF INVENTION, THEN INERTIA IS THE FATHER OF THE AIR BRAKE.

Suggested by the

Westinghouse Traction Brake Company

Works: Wilmerding, Pennsylvania

PITTSBURGH: Westinghouse Building
CHICAGO: Railway Exchange Building
NEW YORK: City Investing Building
ST. LOUIS: Security Building

PUBLISHER'S PAGE

To make the advertising pages useful to readers

The publishers

of the Electric Railway Journal spend a large sum each year for the maintenance of a Service Department to make the advertising pages interesting and useful to readers.

The men

in this department, advertisement writers with engineering training and experience, artists, photographers and draftsmen, help Electric Railway Journal advertisers to prepare copy which is more than a mere word picture of superlative merit. They try to bring out facts that electric railway men want to know about the equipment and material that some day is likely to be wanted.

For this service,

advertisers pay nothing except the regular advertising rates for the space they use. Of course this service helps the advertisers, but it should also be obvious that it helps the readers as well, because it enables them to secure useful information about the equipment and material without which electric railway operation would not be commercially possible.

Make the most

of the thought and labor and money which are devoted to producing the advertisements in the Journal—read them and, if the advertisers invite correspondence, rest assured that a vast fund of useful information may be gathered by the mere writing of a few short letters each week.

Information thus secured

will avoid delay and may save money when your success in your work depends upon getting the right equipment or materials.

Don't wait

until you **must** have the information—gather it as the opportunity to secure it comes before you.

Make the Most of It

O-B Rail Bonds

for

Chicago, Milwaukee & St. Paul Ry.

The first 225 mile section of this epoch making trunk line electrification will use about

30,000 O-B Bonds

This in addition to large quantities of O-B Suspension Type, Type X and Pin Type Insulators and O-B Catenary Materials.

Naturally quality was considered carefully in selecting the materials for this important electrification.

The Ohio Brass Company

Mansfield, Ohio

This Year's Convention

of the American Electric Railway Association

and affiliated organizations, to be held at San Francisco, October 4 to 8, will, as in past years, be fittingly marked by the

Electric Railway Journal Annual Convention Number

Plans are in hand for making this year's issue even more than usually valuable and interesting to the industry. It will be issued

September 18

The Association will, this year, provide no exhibit facilities for manufacturers. Therefore, the advertising pages of the Journal's Convention Number will take the place of the usual Convention exhibit space. Make your plans early.

Unless you have an exhibit at the Panama-Pacific Exposition, this will be your one opportunity to bring your products forcefully to the attention of Convention delegates and visitors, as well as to those railway men who do not attend the convention.

Tear off the Reminder Coupon and hand it to your stenographer now. If more convenient, sign and mail the coupon

If you have an Exhibit at the Exposition, use the Annual Convention Number to feature it.

REMINDER COUPON

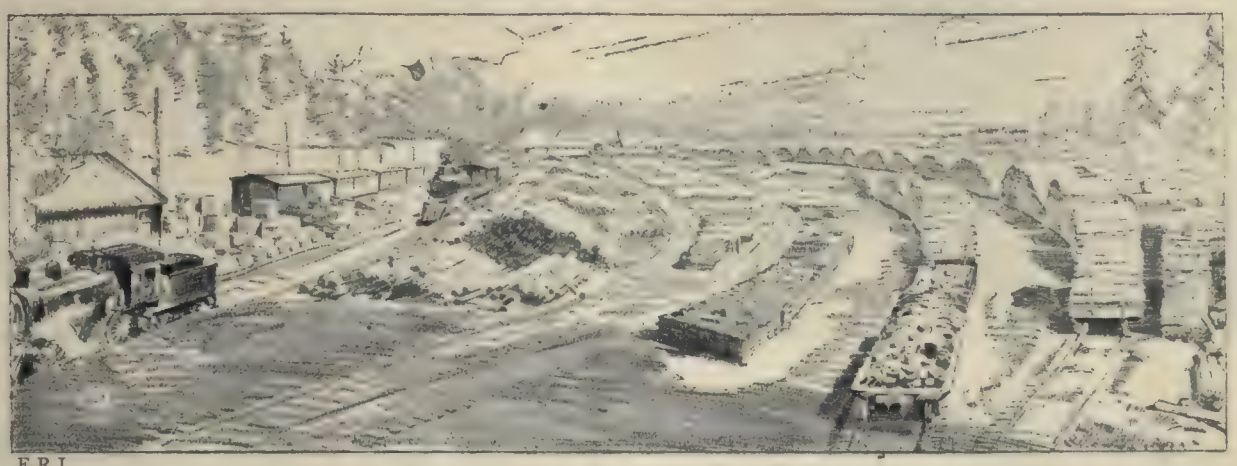
Write the following letter to

ELECTRIC RAILWAY JOURNAL, 239 West 39th Street, New York:
You may submit a suggestion for our use of the Annual Convention Number as exhibit space at this year's American Electric Railway Association Convention.

Name .....

Address .....

Signed ..... **Title** .....



E.R.J.

Our Waning Forests

leave no doubt that the importance of timber preservation must become greater and greater. The thousands of ties, poles, fence posts and trestle timbers that you install today can have their useful lives lengthened 50 to 100 per cent. by skillful application of the correct preservatives. BUT YOU ARE NOT A CHEMIST IN WOOD TREATMENT and hesitate to choose from the many processes now on the market. You may have read that creosote or zinc-chloride is splendid, but as you cannot afford to install your own treating plant you must depend upon the conscientiousness of an outside treating company; or perchance you have been urged to apply at home the cheaper superficial oils although you have no means at your command to analyze the products submitted. Let our

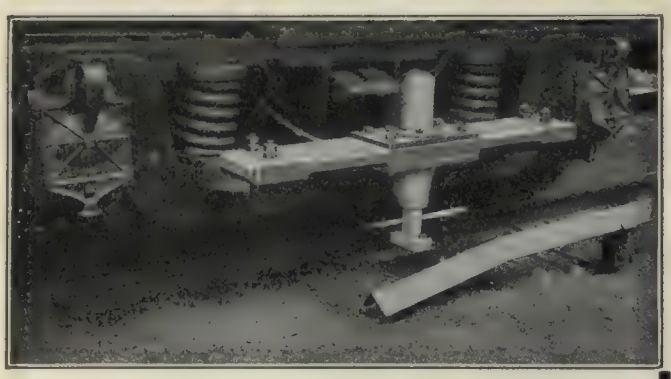
Specialists in Timber Preservation

study your case. Give them the chance to determine what woods are best adapted for your purposes from both the technical and commercial standpoints; to specify the varying treatments for the tie that is to stay in sand or concrete, for the pile that must resist salt water and barnacles and for the pole that must retain its insulating qualities unimpaired; and, finally, let us guard your interests by seeing that your specifications are fulfilled to the letter. Follow this practice and your doubts concerning the merits of timber preservation will be at an end.

ARTHUR D. LITTLE, Inc.

Chemists and Engineers

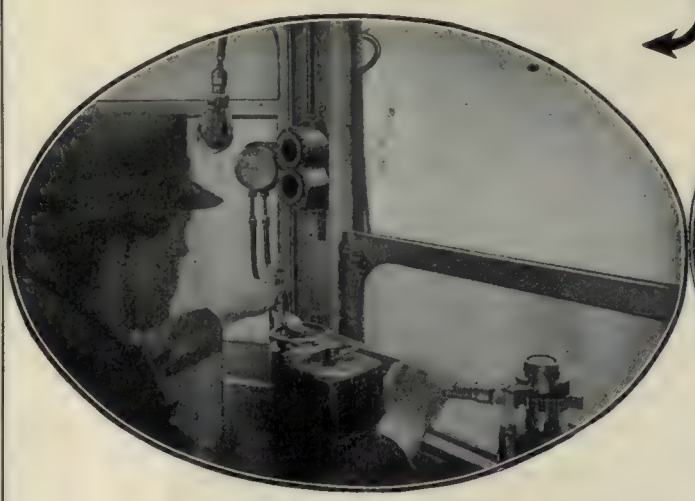
93 Broad Street, Boston Mass.



Every Contact Here

Signals the Motorman

And Signals the Dispatcher



These Results Are Produced Automatically and Instantaneously

For the safe and expeditious movement of cars three things are necessary. First, that movements of every car shall be protected against movements of every other car. Second, that the dispatching authority shall have knowledge of the location of each car, and third, that the dispatching authority shall have communication with each car.

In other words, it is necessary to signal the car to protect it from other cars. It is necessary to know the location of cars to direct movements at all. It is necessary to communicate with the car, if any elasticity in operation is to be had, or in order to meet emergencies.

Under the operation of

THE SIMMEN SYSTEM

These three requirements are brought together in one **electro-mechanical automatic system.** Its operation is interlocked to prevent human error. Its automatic communications are direct from dispatcher to motorman, and from car to dispatcher, **without the intervention of any third party.**

Under the Simmen System, the same contact point which communicates the signal to the motorman's cab also signals to the dispatcher, automatically, the location of the car and makes a permanent record of the time the car reached that location.

The Simmen System, therefore, not only automatically protects the car, but provides direct automatic communication between cars and dispatcher, enabling the latter to directly communicate new orders for meeting points, or to cover any emergency which may arise, thereby insuring that elasticity and expedition in operation which is necessary for the rapid, continuous and SAFE movement of cars.

Simmen Automatic Railway Signal Co.

1575 Niagara St., Buffalo, N. Y.

For the Good of the Service

Equally as important to the railways as the **design** of a signal is the permanence and the experience of the organization which backs the product.

Long ago the United States Electric Signal Company laid out their policy on the theory that **experience** and **conservative engineering** are of greater value to the buyer than experimentation and sales-enthusiasm.

And that is why in all announcements prepared by this company every statement can be substantiated by **facts.**

When it is stated that **United States** electric signals will do a certain thing—no discount need be placed on the assertion—they will **do it.**

It is our earnest desire to establish relations of mutual benefit with the railways.

We believe that this can be accomplished only on the basis of RELIABILITY in statement and in product.

Don't you?

U.S. ELECTRIC SIGNAL CO. WEST NEWTON, MASS.

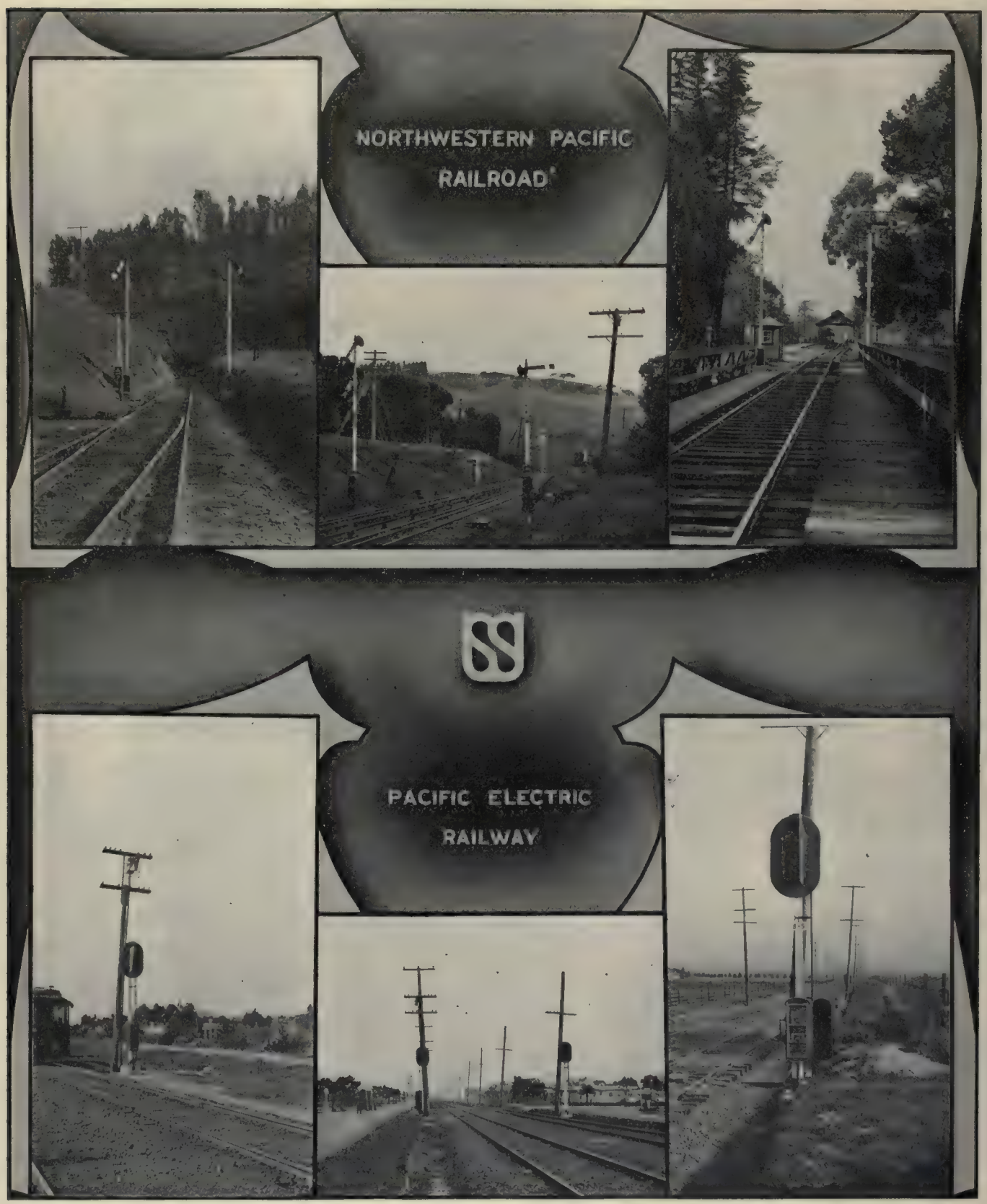
United States Electric Signal Co.

West Newton, Massachusetts

Foreign Representatives

Quilliam Brothers, Cleggs Court, Chapel Street, Salford, England

Automatic Block Signaling on Electrified Roads



The Union Switch & Signal Co.

Founded by Geo. Westinghouse 1881.

SWISSVALE, PA.

Trade Mark

Hudson Terminal Bldg.
NEW YORK

Peoples Gas Bldg.
CHICAGO

Canadian Express Bldg.
MONTREAL

Candler Annex
ATLANTA

Railway Exchange Bldg.
ST. LOUIS MO.

Pacific Bldg.
SAN FRANCISCO

Represented by the GENERAL ELECTRIC CO. in Australasia, South Africa and Argentina

Trade Mark

JOHNS-MANVILLE SERVICE TO THE ELECTRICAL INDUSTRY

PERHAPS you, too, can use Johns-Manville Service.

Have you ever counted the many products this Service offers you in all departments of your work?

When you realize the comprehensiveness of this Service, you will no longer associate it with your favorite tape or battery, but recognize it as the biggest Efficiency Maintenance Help anywhere.

Johns-Manville Service means more than a few products; it embraces many needs of the Electrical Engineer wrapped up in a water-tight obligation to **make good** on your job.

If you haven't this idea of Johns-Manville Service you are not getting all that it offers you. Why not get close to it?—in the interests of your work.

It is not always possible to get greater efficiency at less cost. J-M Fibre Conduit is exceptional in this way.

It is often necessary to increase expenditure to gain efficiency in engineering operations, and the extra expense is justified because of the ultimate saving effected.

In underground cable installations, it is not only possible to increase the electrical and mechanical efficiency of the finished work, but actually save money in the construction, too.

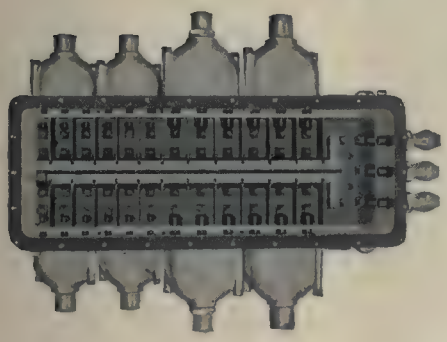
J-M Fibre Conduit eliminates a great part of the preliminary expense, in hauling, handling and breakage, owing to its extreme lightness and strength.

It effects another saving in the ditch, because it is easily and quickly handled and laid. It couples up faster.

After the work is finished, a duct has been laid that is mechanically and electrically superior to any other form of construction, and if not more permanent, certainly of equal permanence.

Ask nearest branch for detailed information on J-M Fibre Conduit.

Covered with 7 feet of water for months and still on the job—"Noark" Subway Boxes



There is more to the design of Subway Boxes than good electrical construction. The containing box must also be mechanically sound.

What could be more convincing than a submerged test on a box giving service in a manhole, inundated with water, not momentarily, but for months?

The fact that the iron used in "Noark" boxes is close grained, that the gaskets are seamless and of the best resilient rubber and that all cable unions are "made up" like high pressure water mains, assures water tightness that is absolute.

Every casting in "Noark" Subway Boxes is accurately machined so as to seat perfectly, and every tapped hole for studs and holding screws is drilled blind.

It is the sum of all these features that individualizes this line and this explains why "Noark" Subway Boxes give continuous service under most severe conditions.

Let us quote you on your underground requirements.

Write for literature on these products. You will find it highly interesting.

H. W. JOHNS-MANVILLE CO.

Manufacturers of Service, Subway and Transformer Boxes; Line Materials; Insulating Materials; Fibre Conduit; Fireproof Wood; Friction Tapes; Dry Batteries, Lighting Systems, etc.

Akron	Boston	Columbus	Duluth	Kansas City	Minneapolis	Philadelphia	St. Paul	Toledo
Albany	Buffalo	Dallas	Galveston	Los Angeles	Newark	Pittsburgh	Salt Lake City	Washington
Atlanta	Chicago	Dayton	Houghton	Louisville	New Orleans	Portland	San Francisco	Wilkes-Barre
Baltimore	Cincinnati	Denver	Houston	Memphis	New York	Rochester	Seattle	Youngstown
Birmingham	Cleveland	Detroit	Indianapolis	Milwaukee	Omaha	St. Louis	Syracuse	

THE CANADIAN H. W. JOHNS-MANVILLE CO., LTD., Toronto, Winnipeg, Montreal Vancouver

3151a 3226 DB

AGASOTE
HEADLINING
PANTASOTE CURTAINS
PANTASOTE CURTAINS
Agasote
Headlining and Wainscoting
Pantasote
Curtains
Latest car of the
East Liverpool Traction & Light Co.
East Liverpool, Ohio
The
Pantasote Company
New York Chicago
San Francisco Montreal
AGASOTE
AGASOTE

Send for It To-Day

It Will Count in the Construction of Your Transmission Lines

For the question of conducting material—other things being equal—is determined on a basis of dollars and cents.

And since the question of conductivity and strength show that Aluminum can hold its own against copper, the issue is one of cost alone.

At the average market price Aluminum is 35% to 45% less in cost than copper.

Just what that means to you is carefully discussed in our new book.

Fill out the coupon and send for it.

ALUMINUM COMPANY OF AMERICA

PITTSBURGH, PA.

New York Boston Chicago San Francisco

Aluminum Company of America
Pittsburgh, Pa.

Gentlemen: Kindly mail me your new book on "Aluminum for Electrical Conductors."

Name.....
(Full name and title.)

Address.....
(City and Street.)

Occupation.....

Columbia Electric Hoist in service lifting 40 foot 20 ton car.

Columbia Electric Hoists

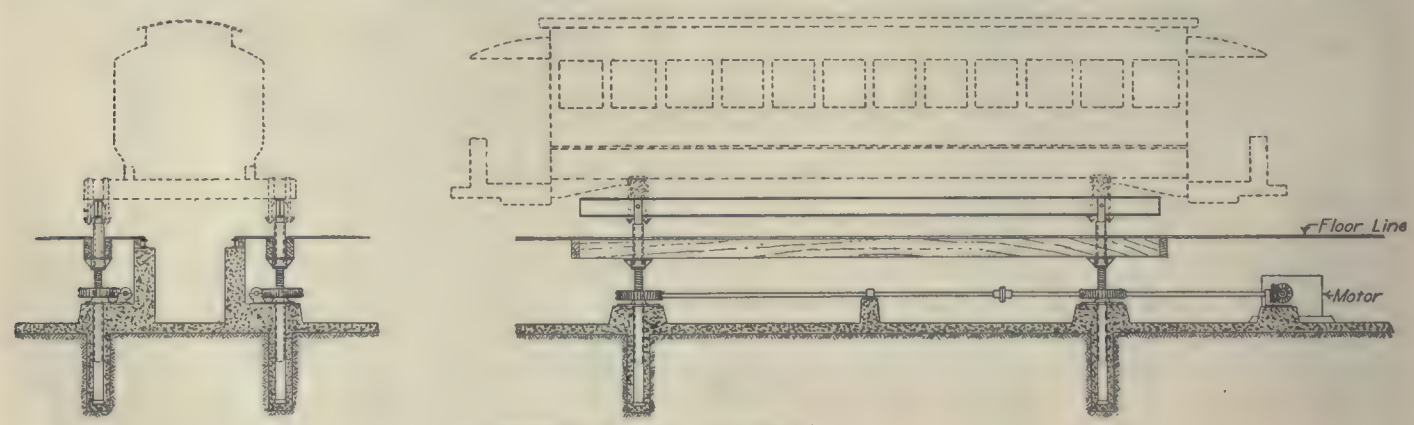
in the

Holyoke (Mass.) St. Ry. Co. Shops

In the repair shop bay of its new carhouse, the Holyoke Street Railway Company has provided two Columbia Electric Car Hoists for lifting car bodies from the trucks. Columbia Hoists were chosen because of their superior design, their ease of operation, their extra factor of strength and their contribution to repair work economy.

We can serve you just as efficiently.

Write us regarding your needs.



Columbia Electric Car Hoist

Columbia Repair Shop Specialties and Car Equipment Include

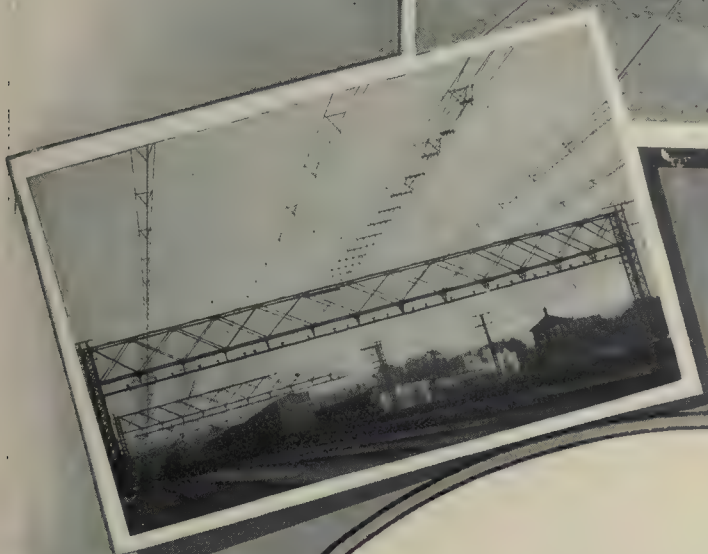
Axle and Armature Straighteners.
Bearings for Armatures and Axles.
Armature Stands, Armature Buggies.
Car Hoists, Car Replacers.
Brake Appliances, Handles, Forgings for Brake Rigging, etc.
Babbitting Moulds, Lathe Chucks.

Banding and Heading Machines.
Coil Winding Machines for field and armature coils.
Coils for Armatures and Fields.
Coil Taping Machines for Armature Leads.
Rolls for Flattening Leads of Armature Coils.
Car Trimmings, Car Signs—Day and Night.
Commutators, Controller-Handles, Door Locks.

Gear Cases—All Steel and M. I., Pit Jacks.
Grid Resistances, Signal or Target Switches.
Pinion Pullers, Trolley Poles—Steel.
Trolley Wheels, Tension Stands.
Fuses, N. W. Cartridge.
Car Wheel Hoists and Special Track Work.

Columbia Machine Works & Malleable Iron Co.

Atlantic Ave. and Chestnut St., Brooklyn, N. Y.



"PHONO-ELECTRIC" Trolley Wire

for

Catenary, Cross-span or Bracket Construction

"PHONO-ELECTRIC" is a trolley wire you can absolutely depend upon. IT'S TOUGH—does not rely on a hardened skin for its strength—it is uniform throughout its cross-section.

Unvarying reliability is what you're looking for in a trolley wire. **More car mileage and longer service life.**

The demand for better cars, better road beds and faster schedules is an indirect demand for better overhead wires.

"PHONO-ELECTRIC" saves renewals and renewals cost money. It will give the longest service life.

IT'S TOUGH.

BRIDGEPORT BRASS COMPANY
BRIDGEPORT, CONNECTICUT

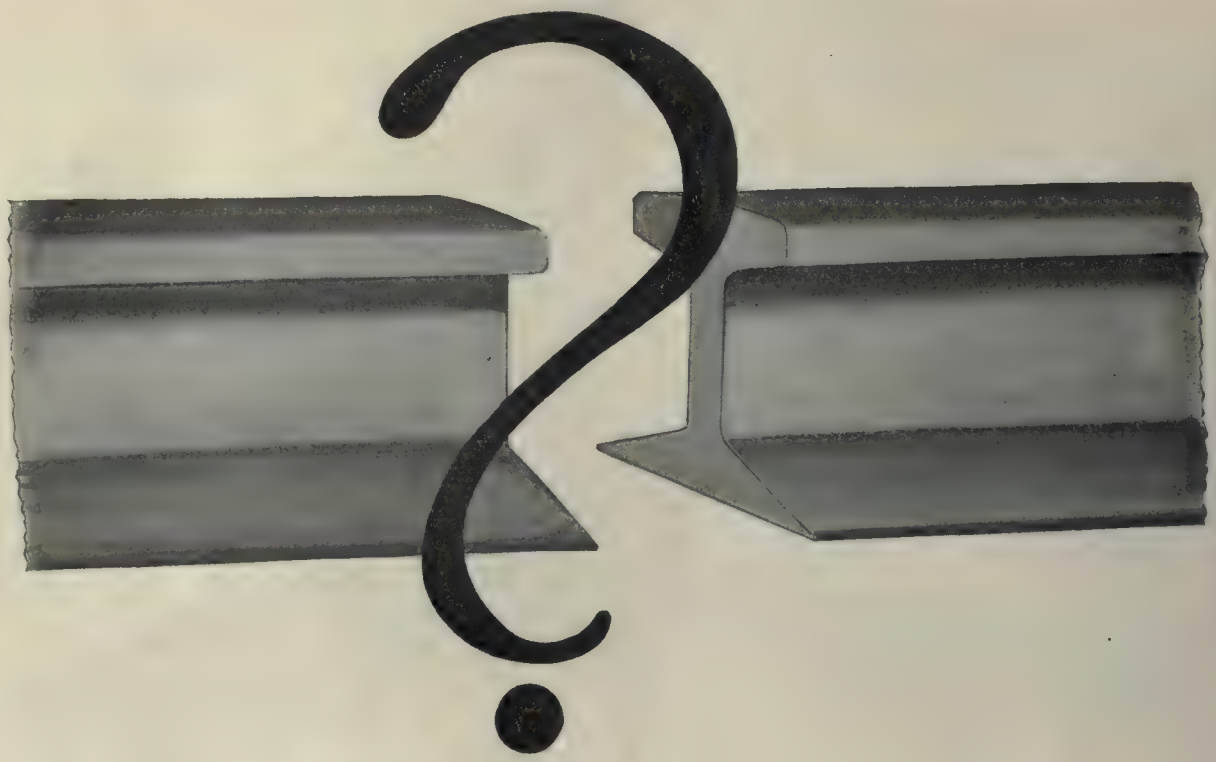
North American Copper Company
164 Front St., New York, U. S. A.

Pierson, Roeding & Company
San Francisco Portland Seattle Los Angeles

The Equipment & Engineering Company
2 and 3 Norfolk St., Strand, W. C., London, England

Phono-Electric

Phono-Electric



How

are you going to complete that gap in your circuit?

The logical way is to make a one-rail circuit out of the two.

To do this, the logical method is to electric weld them with rail bonds that will "stay put," that will not shake loose or corrode.

Electric Weld Rail Bonds

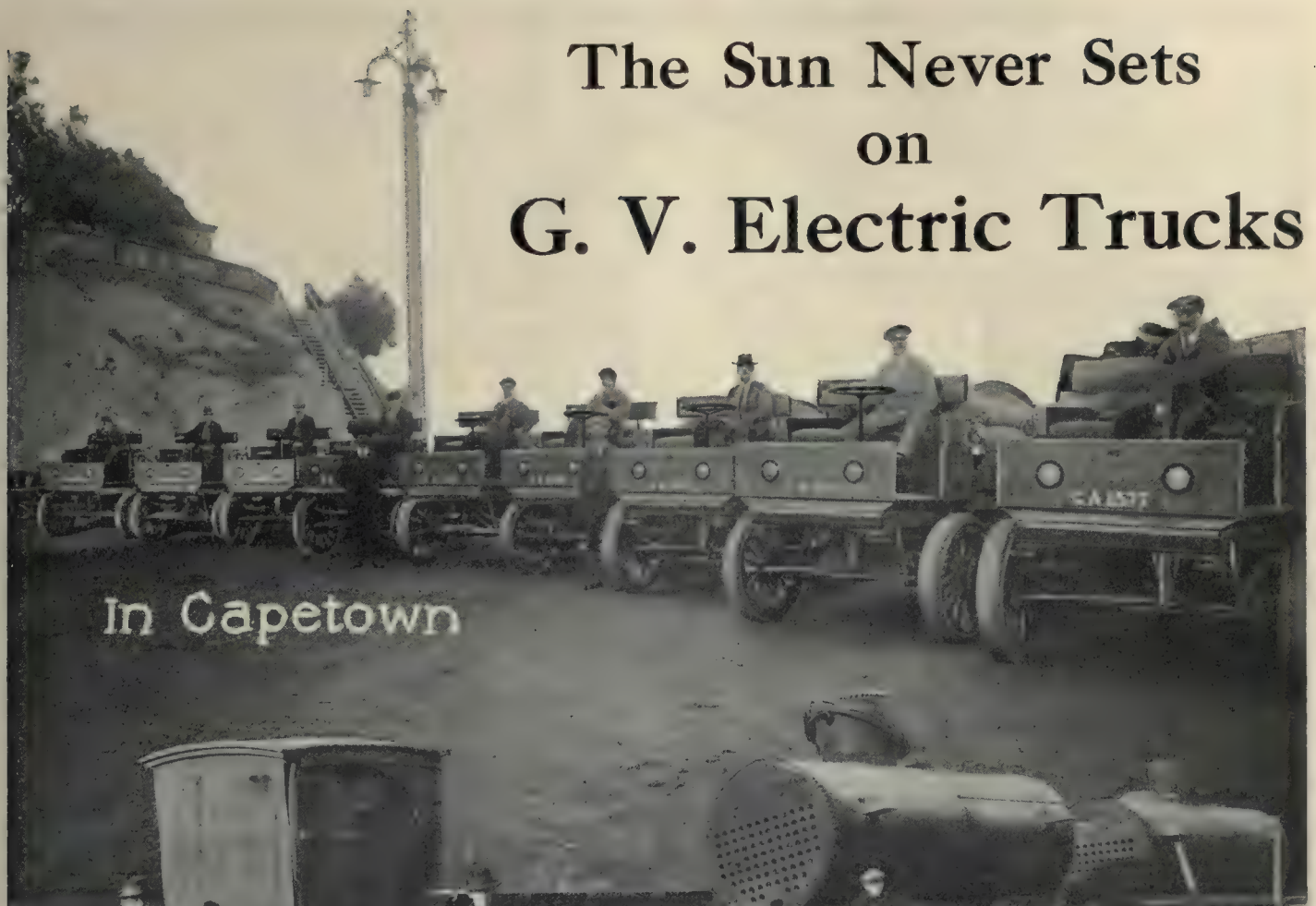
make permanent junctions that have the service life of the rails themselves.

Consult us—or any user.

The Electric Railway Improvement Co.

Cleveland, Ohio

The Sun Never Sets on G. V. Electric Trucks



One of the big South African Railroads uses this fleet of nine G. V. Electric Trucks for delivering freight to consignee; others for its own work.

The Spokane picture shows a two-ton G. V. towing a 22-ton load.

In Manila coal is handled in baskets. The lower photograph shows a five-ton G. V. with its load. One of 33 used by Uncle Sam there.

Over 100 leading public utility companies throughout the world are profiting by the economy of G. V. Electric Trucks. Nearly 5000 of them are in service.

These trucks are fitted with specially designed bodies suited to the service required. We have built a wide variety of dumping bodies, winch-equipped trucks, hoist-equipped emergency wagons, tower wagons, crane trucks and tractors.

Send for the interesting illustrated catalog J-82.

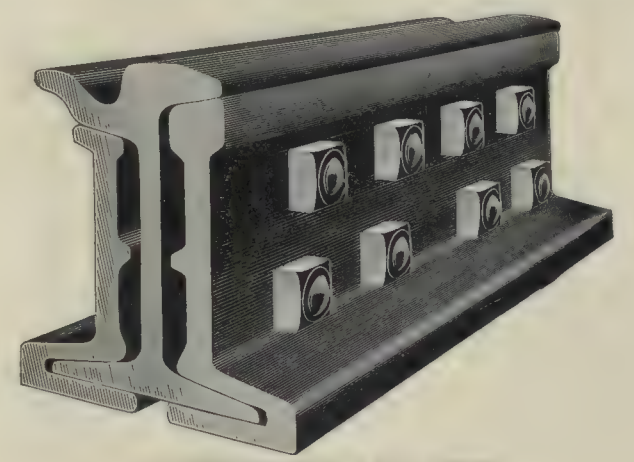
General Vehicle Company, Inc.

General Office and Factory, Long Island City, N. Y.

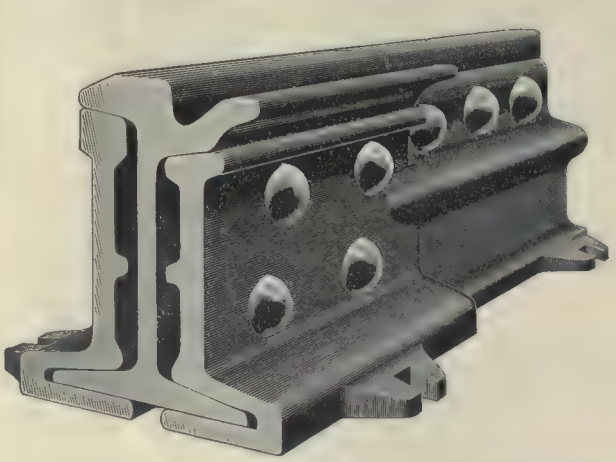
NEW YORK CHICAGO BOSTON PHILADELPHIA

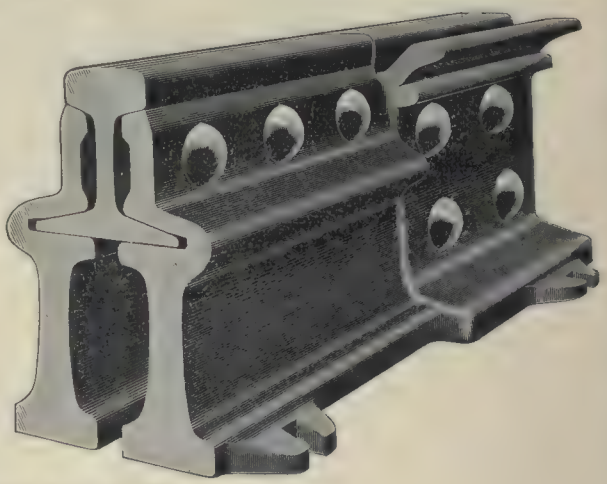
The Rail Joint Company
185 Madison Avenue
New York

Makers of Base-Supported and One Hundred Per Cent. Rail Joints for Standard Girder, and Special Rail Sections. Also Joints for Frogs and Switches; Insulated Rail Joints and Step or Compromise Rail Joints. Patented in United States and Canada.



CONTINUOUS GIRDER RAIL JOINT





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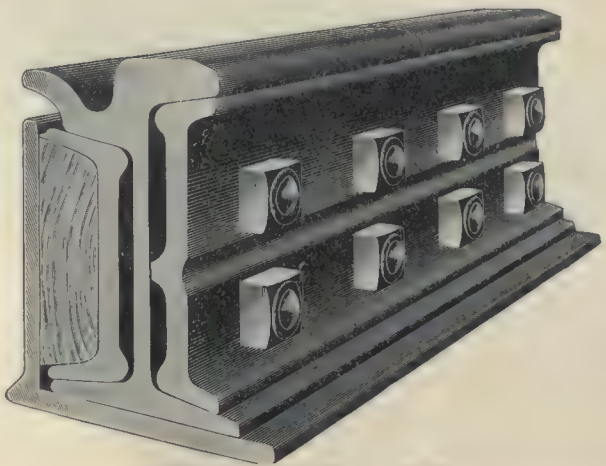

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Use this machine to rejuvenate your track this spring. It is the ONLY machine that grinds everything—corrugations, special work, low and pounded joints. It grinds in the groove and on the gauge line as well as on the head of the rail. Derails under power.

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OUR efforts are concentrated continually on fare protection in all its phases. We *know* that a mechanical device is necessary to accomplish that which a machine can do better than a man. The Ohmer Fare Register is such a machine. It does not attempt to do what a man can do better, but it does compel the man to do his part the very best he can. The man, supplemented by the machine, gives the most perfect and complete fare protection possible.

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The fact that the Ohmer System is absolutely fair to both man and manager; the fact that it is a distinct success on the hundreds of city and interurban properties where it has been made a standard; the fact that it meets the most exacting demands of the most modern managements; these facts should mean something to you.

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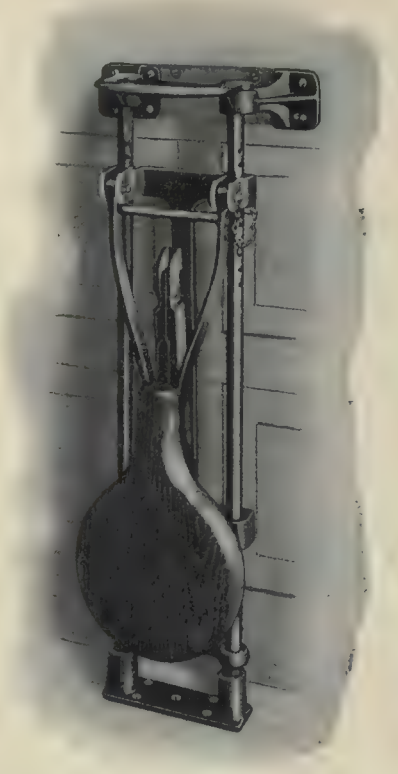
Dayton, Ohio



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The striking point of advantage in this new Keystone Motorman's Seat is in the fact that the seat proper with its vertical rods and collapsible support may be easily removed from its supporting bracket and floor plate and transferred from one end of the car to the other.

Or seats may be interchanged among any number of cars, it being necessary merely to provide a floor plate and bracket on each end of each car. **The advantages of this arrangement will be readily apparent.**

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Let us give you further details and quote prices which are very attractive.

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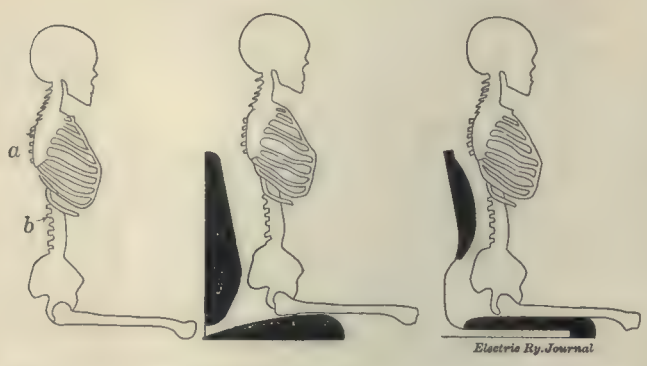
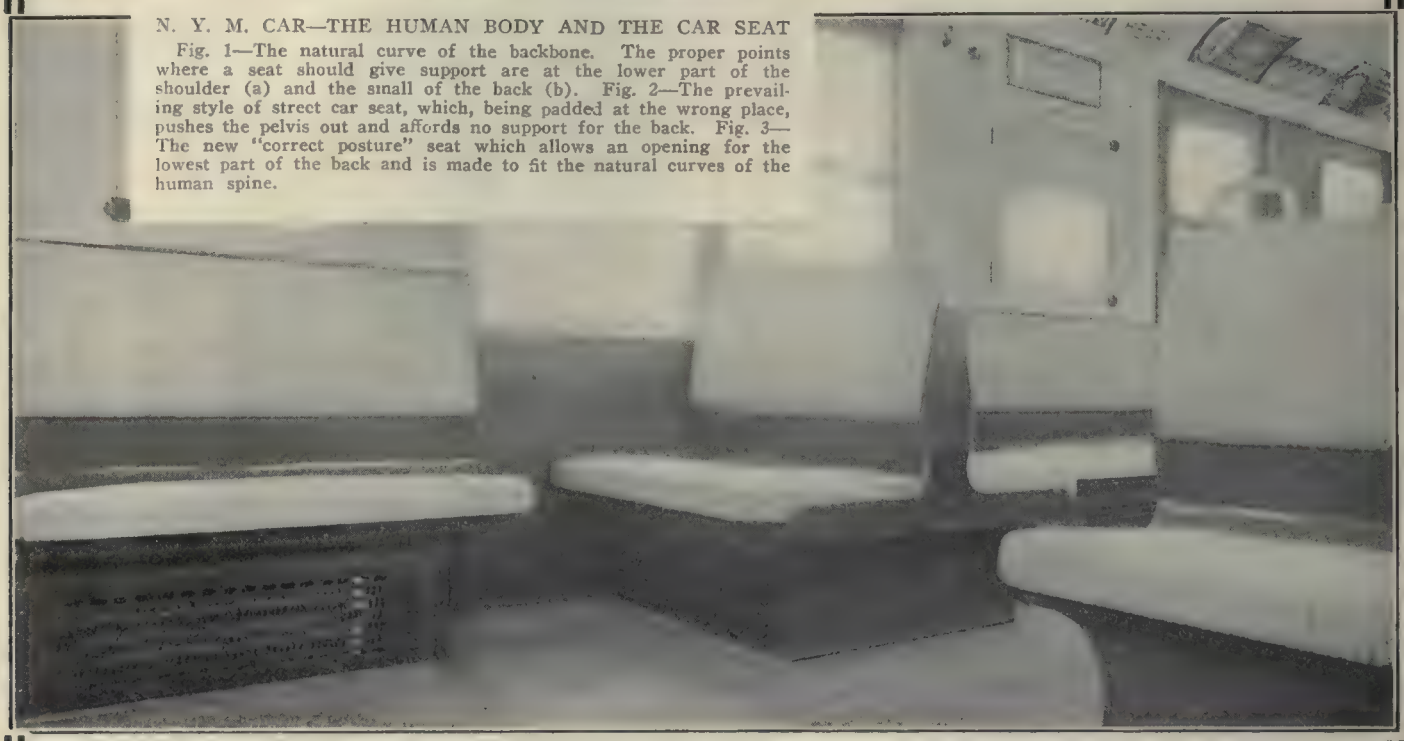


N. Y. M. CAR—THE HUMAN BODY AND THE CAR SEAT

Fig. 1—The natural curve of the backbone. The proper points where a seat should give support are at the lower part of the shoulder (a) and the small of the back (b). Fig. 2—The prevailing style of strect car seat, which, being padded at the wrong place, pushes the pelvis out and affords no support for the back. Fig. 3—The new "correct posture" seat which allows an opening for the lowest part of the back and is made to fit the natural curves of the human spine.



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Every detail in construction which would add to public comfort, expedite operation, simplify or economize on maintenance was considered in the planning of this equipment.

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Can be worked out for Reversible Seats also.

We are ready to co-operate with your engineers in working out types of car seats.

Unusual facilities for high-grade and rapid production will be afforded you.

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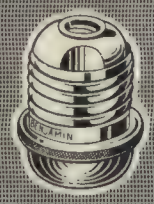

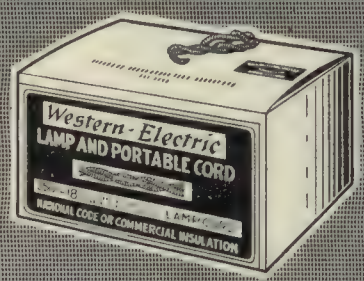

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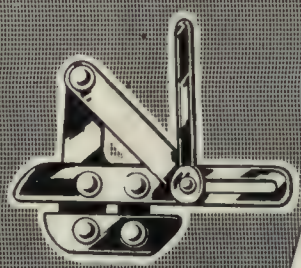

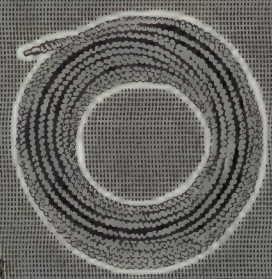

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Manufacturers of the 8,000,000 "Bell" Telephones

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"DO IT ELECTRICALLY"

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Select the V-K equipment when you next order—if you want to ensure good service and make substantial and permanent operating economies.

Send for our new illustrated catalog. It contains full information on sizes, styles, etc., covering our whole line of wheels and harps.

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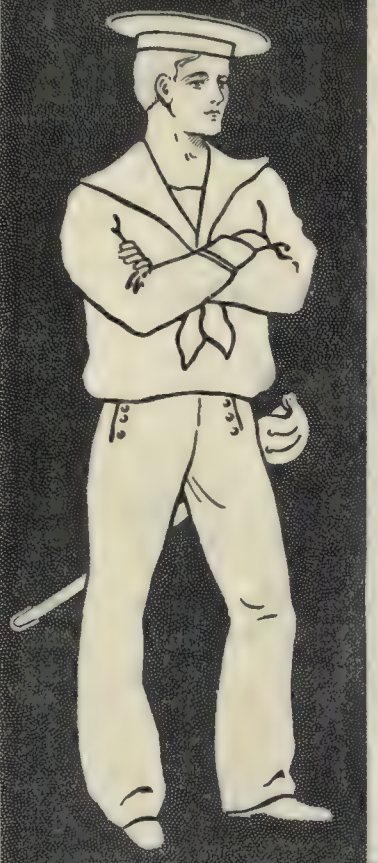

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safe car operation when you have such factors as memory, chance, delays and effort behind your scheme of protection.

You can banish these factors from **your** road.

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This is not guff. There's ample evidence from roads using Chapman signals to substantiate every word—and YOU ought to have these records.

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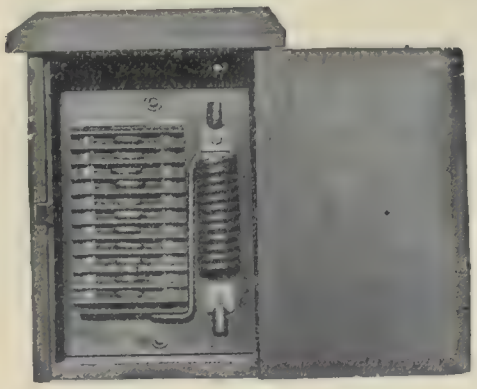

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Dont' "lock the stable after the horse is gone." Don't get protection against lightning after property destruction has followed in the wake of a storm. Put in your "ounce of prevention" now in the shape of

AJAX Lightning Arresters

They are practical devices embodying all that there is to be interposed in the way of lightning discharge. They will keep eternal watch over your circuits. It may mean thousands of dollars to you.

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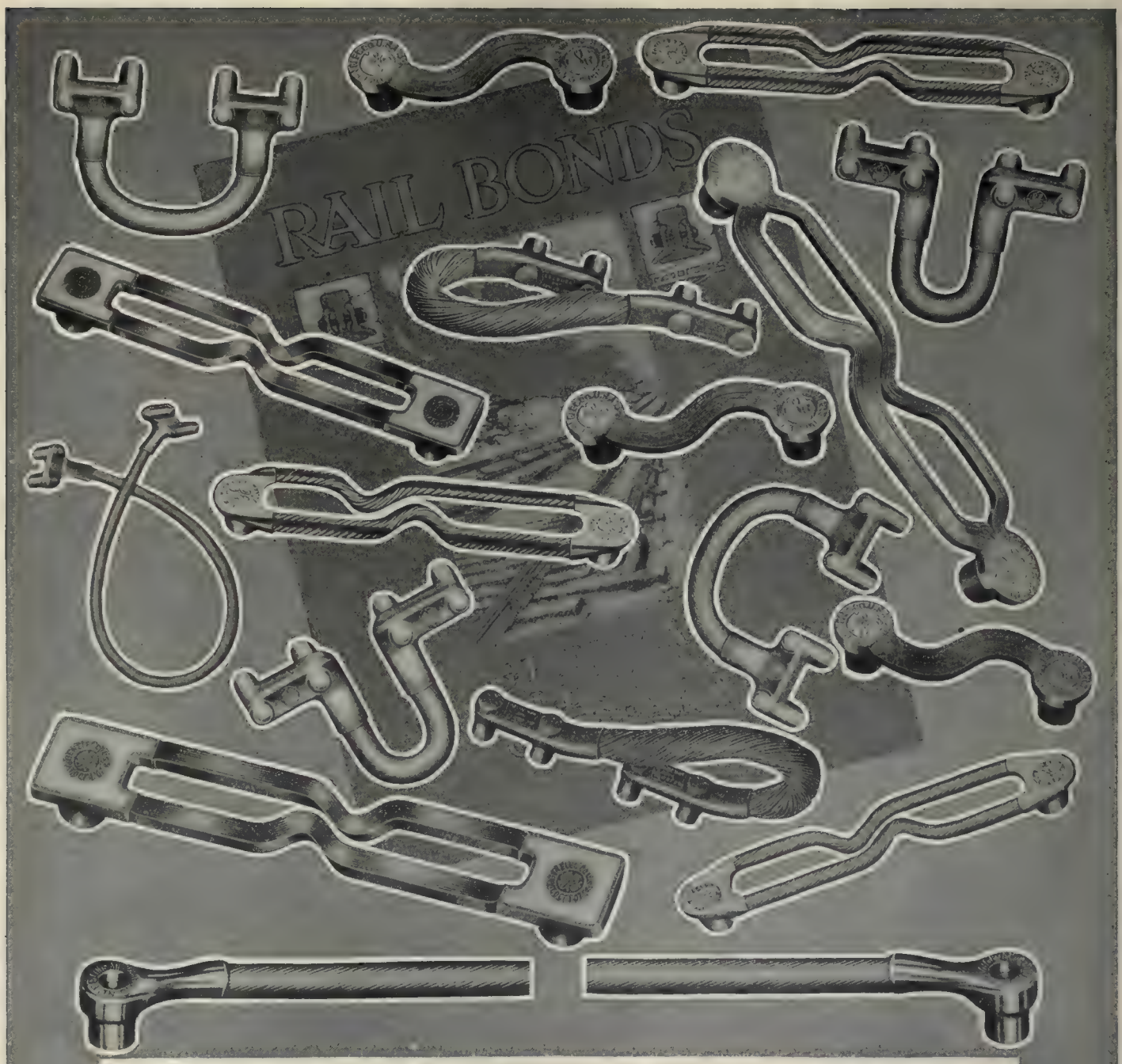

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Electric Railway Journal

Published by the McGraw Publishing Company, Inc.

Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLV NEW YORK, SATURDAY JUNE 5, 1915 No. 23

FOOL-PROOF LOCOMOTIVES

Judging by the most recent electric locomotive designs, the aim of the builders is to produce a machine that will stand any amount of rough handling. Both the Chicago, Milwaukee & St. Paul and the Norfolk & Western railroads will have locomotives that can exert full accelerating effort for a period of five minutes without injurious heating even though they may be unable to move. This is, indeed, a most important qualification. Ruggedness in design has received attention over everything else for years in railroad service, as is only to be expected. The primary object is the movement of freight. Considerations of economy are largely subordinate, and even satisfactory explanations of train delays constitute a poor return for the loss of earning power that has been involved. Heretofore the electric locomotive has frequently, and justly, been accused of being like an over-willing horse that would work itself to death if given the chance. As the chance is always given on a railroad, this feature has been a decidedly weak one, and now that the new form of motive power has embraced the principle of having a continuous capacity that is almost equal to its hourly rating, together with an ability to stand still almost indefinitely while exerting full tractive effort, its possibilities have broadened enormously.

ELECTRICAL VERSUS MECHANICAL FAILURES

With the rapidly increasing interest in the electrification of steam railroads a question as to the relative reliability of electrical apparatus seems to have arisen quite frequently. The matter is, of course, impossible of direct settlement, but general indications point to the fact that the electrical machinery now being used for locomotives operates largely without repairs and with but comparatively little attention. As an example, on the New York, New Haven & Hartford Railroad's electric freight locomotives, there were eight engine failures during March. Two were due to hot bearings and two to broken parts. Four were due to electrical grounds and presumably were remedied without a vast amount of trouble. During the previous month exactly the same relation of mechanical to electrical failures was recorded, and incidentally it may be said that, during both months, the switch engines on the same road operated without failures of any kind. In the end the rugged equipment of electric locomotives hardly comprises enough inherent "grief" for the master mechanic to consider seriously. His work under electrification will be, as it always has been, the mechanical repairs involved by the heavy wear and even physical abuse to which every locomotive is subject.

CLEARANCE LIMITATIONS WITH ELECTRICITY

The two widely different types of electric locomotives which are described elsewhere in this issue possess the common characteristic of literally enormous power, and this has very material significance in view of the trend of modern railroading. Heavy trains are, of course, essential under the long-haul conditions that prevail in this country, and the constant endeavor to increase tonnage has resulted in a veritable struggle on the part of the locomotive designer to produce machines capable of meeting the demands of the transportation department. The difficulty with the large steam locomotive has been to confine its dimensions to the limits established by the standard gage and the tunnel and bridge clearances, and it has taken years of gradual development to bring the steam-driven unit to the point it has reached today. The electric locomotive, on the other hand, is inherently compact in design, and it has in one step acquired superiority in power over the steam locomotive, both of the electric units under discussion, with tractive efforts of the order of 100,000 lb. exceeding even the largest steam locomotives of the Mallet type. For the immediate future, perhaps, no demand will exist for much more powerful machines than these. But with the general introduction of the new couplers, with draft rigging to suit, the present limits on train length will again be advanced, and as the electric locomotive escapes absolutely any handicap involved by over-all dimensions it will be easily possible to provide designs suitable to the new conditions.

TESTING MOTOR INSULATION

As a result of the long experience of designers and users of electric railway motors and of electrical machinery in general, standard recommendations as to insulation tests have been evolved. Such recommendations are incorporated in the A. I. E. E. standardization rules, which specify a test voltage of twice the normal plus 1000, and in the recommended practice of the A. E. R. E. A. For trolley roads the latter specifies 2500 volts alternating current for five seconds on new armatures and fields, and 1000 volts alternating current for five seconds on old armatures and fields. This practice appears to be rational, as it provides a test which, while searching, is in no wise destructive. The factor of safety is no more than is reasonable to provide for deterioration in service and to enable the insulation to stand the extra voltages sure to be imposed upon it. Such extra voltages are produced by the opening of circuit-breakers, resulting in sudden collapse of the magnetic field of the motors, with consequent self-induced voltages. High voltage discharges are apt to occur also

during atmospheric disturbance, as is clearly evident in strings of incandescent lamps connected between trolley wire and ground when a thunderstorm is in progress. While we understand that some, and possibly many, railways do not employ the high-voltage tests on account of their supposed severity and at the same time have very satisfactory success in maintaining motor equipment, it is probably true that the motor insulation in these cases is so carefully looked after anyway that it would withstand the recommended test voltages without injury. It is obvious that recommended standards can only be successful when they epitomize good practice in their respective lines, but when they have been evolved as in the present case by competent representatives of both manufacturer and user there is every reason for adopting them and profiting by them.

SUPPLEMENTARY FINANCING

The sale of about $9,890,000 of cumulative first preferred stock by the Pacific Gas & Electric Company during the eleven months ended April 30 has caused considerable comment in regard to the rise of such a class of securities as a financing medium. Probably the ablest exposition of this subject is that presented by G. K. Weeks, president San Francisco-Oakland Terminal Railways, before a recent meeting of the San Francisco section of the American Institute of Electrical Engineers.

It goes without amplification that the primary financing of public utilities is accomplished through the sale of mortgage bonds. Owing to the existence of certain conditions, however, additional financing is generally necessary. In the first place, bondholders and bond houses are chary of investing in any property that does not provide a one-quarter or one-third equity above the mortgaged indebtedness. Some public service commissioners have had this fact in mind in expressing the opinion that not more than 75 per cent of the investment in any public utility should be secured through the sale of bonds. In the second place, every well-drawn indenture of an open-end or limited-open-end character contains a provision that all bonds subsequent to the original issue may be sold to cover only a specified percentage of new capital costs—such percentages usually ranging from 66 2/3 to 90 per cent. It is evident from these facts that from 10 to 33 1/3 per cent of public utility investment must be secured from stockholders' assessments, surplus earnings or the issuance of junior securities.

Assessments of stockholders are, of course, unpopular and can be considered as only emergency measures of the most extreme type. Moreover, the surplus earnings that are available for reinvestment in the case of most properties are not large enough to take care of the additional financing even if such were desired. Paradoxical as it may seem, the larger and more prosperous the utility, the less likely it is to possess sufficient surplus to provide all needed capital above that obtainable from mortgage bonds, for with its progressiveness and potential prosperity comes a correspondingly increased need for new construction and extensions. The third expedient, junior securities, is also not without its difficulties, for the inclination may be to secure the needed funds through the issuance of short-term obligations, funded or unfunded, which on account of their comparatively imminent payment or refunding only serve to complicate the supplementary financing as the necessity for this continues year by year.

By virtue of necessity, therefore, it seems that some authorized stock issue should be used for supplementary financing. This step is not at all devoid of propriety, however, for it is quite fitting that the equity above mortgage indebtedness should be created by those who through their voting power control the management and who share in the disposition of the net income. But what sort of stock should be sold—common or preferred? The answer to the question, we believe, depends on the interrelated factors of marketability and valuation. In the case of companies with a larger surplus, a good dividend record and all outstanding stock fully covered by property investment, it may be possible to dispose of common stock at the price fixed by the authorizing commission. Such a method is conservative and satisfactory. Yet if the outstanding stock issue is already in excess of a recognized valuation, or if a general financial stringency makes unattractive the issuance of common stock, the logical medium to be used is preferred stock. A cumulative and non-assessable issue of this kind, perhaps participating both as to dividends and as to assets, is desirable as a standard in all cases when common stock cannot well be sold. It is wise to have a check against over-extension, such as the California Railroad Commission provision that if the property value amounts to only 50 per cent of the par value of the preferred shares outstanding after deducting senior obligations, no more of such stock may be sold even if a market exists at a satisfactory price. With such a safeguard to investors, preferred stock should become quite popular as a supplementary financing medium.

SIMPLICITY—AN ESSENTIAL OF DESIGN

It is frequently the case that American machines are classed as crude, an imputation that is generally extended to our mechanics as well. No doubt there is much upon which to base such a belief, but even so, the rough-and-ready practices that have been at the root of our machine design, especially in the field of transportation, have not been adopted without material reasons to commend them. Indeed, it is with more than a trace of doubt that many engineers of to-day look upon the ready acceptance of complication for the sake of somewhat improved economy, and it may well be asked whether the growing spirit of willingness to abandon the rugged, albeit somewhat uneconomical, designs of the past fifteen or twenty years is going to be altogether beneficial.

Probably the best example of the change that seems to be taking place is found in the steam locomotive, which for some four score years remained almost exactly in the form devised by one of the earliest of its

designers. Such changes as took place were largely those of increased size. The details remained the same, and even they were limited to the minimum established by a rigid policy of simplicity. But within the past ten years these conditions have been absolutely reversed, and to-day the steam locomotive in many cases is a bewildering complexity of compound cylinders, articulated frames, superheaters, feed-water heaters and other things that are characterized, even by the younger generation of officials, as "frills" whose liability to breakdown increases engine failures. Already there is arising a question as to whether or not they really pay.

In the field of power generation the rise of the Diesel engine is equally conspicuous. Compared with the turbine its multiplicity of parts seems to be infinite. Its economy, of course, is excellent and its ability to avoid stand-by losses during the hours of no load constitutes a splendid argument in its favor. Yet do these advantages compensate at all for the fact that the failure of one of its many essential details means a shut-down? Apparently an affirmative answer has been frequently given, at least in England, where insurance of Diesel engines against break-down seems to be the rule, the annual premiums ranging from 3 per cent to 7½ per cent on the amount of the insurance. These rates, it is true, are considered by the Diesel Engine Users' Association to be unduly high, but at that is it possible to calculate the indirect losses due to a shut-down? Certainly the normal savings of a slightly improved operating efficiency are a small return for the enforced use of a prime mover whose reliability, unlike that of Caesar's wife, is always subject to suspicion.

The tendency toward the acceptance of complexity in design in the electric railway industry is perhaps not distinguished by any particularly shining example. Yet automatic details that stand very close to the border line of "frills" in their limited ability to improve operating efficiency as opposed to their complexity have been introduced by the score during the past five years. Many of them, of course, have fallen by the wayside. But on the other hand, many more have sprung up to take their places so that in the end every railway is constantly under a temptation to adopt devices which will admittedly effect a saving, but which cost enough more in labor and in lost time to reduce the saving to zero. This it would seem is something that could well be borne in mind at all times by railway managers. To make an increase in operating efficiency may not be excessively difficult, but to make it simply is a problem of Gargantuan proportions.

THE PHASE CONVERTER

By the use of a simple but commercially novel phase converter it has been possible to combine the advantages of single-phase power distribution and three-phase torque production in the Norfolk & Western locomotives which are exhaustively described in this issue. The principles of operation of this particular type of converter are fully described in the article. The peculiar virtues of the polyphase motor for certain kinds of heavy railroad work were clearly laid down by Cary T. Hutchinson in his A. I. E. E. paper of Nov. 12, 1909. In spite of these facts but one traction application of this motor has heretofore been made in the United States, the chief obstacle to its progress in this field having been the second overhead wire. The phase converter renders this wire unnecessary, and is considered by the designers in the present case the lesser of two evils.

The induction motor is ideal as a phase converter in most particulars. It is simplicity itself structurally, and its ruggedness leaves little to be desired as to durability. There is no limit to the speed of the rotor excepting that set by the strength of the constituent parts so that the machine may be made quite light per unit of output. Like the traction motors it imposes no frequency limitations on the power supply, and it requires even less attention than the motors as there are no sliding contacts.

The addition of induction apparatus to the equipment necessarily involves some exciting current with corresponding loss of efficiency and lowering of power factor, and there are bearing, windage and electrical resistance losses also. Only a part of the power, however, passes through the phase converter, and this fact must be borne in mind in estimating the relation of the phase converter losses to the total input. The main problems in connection with the converter design have not been in reducing power and other losses, in the control of which there is much experience to guide, but rather in counteracting the effects of magnetic reactions. When a simple phase converter, like that described in the article, furnishes current to a load circuit that current reacts upon the revolving field and shifts its phase position. This effect appears in the load circuit as a phase displacement of emfs; in other words, the voltages become unbalanced. The efficiency of the circuit as a power producer is correspondingly impaired. The T-connection of the stationary transformer and the phase converter windings in the Norfolk & Western locomotive give a simple means of correcting phase distortion by shifting the point of T-connection. A second plan not substantially different in principle for neutralizing the reactive mmf, as experimentally developed by the General Electric Company, was described in the issue of the ELECTRIC RAILWAY JOURNAL for Oct. 11, 1913, page 678. In this a variable amount of line emf is introduced into the quadrature circuit (in a two-phase motor) to bring the emf of the latter to its normal value and phase position. In the General Electric plan also the converter was excited from an auxiliary winding carried on the cage-wound rotor and supplied with current from a synchronous exciter for the purpose of improving the power factor.

In view of all of the above facts regarding the phase converter it will be interesting from the electrical engineering standpoint to have, for purpose of comparison with other systems, the following among other data: The power factor in the line circuit at various loads; the voltages and phase relations in the three-phase and two-phase circuits under starting and running conditions, and the efficiencies of the locomotive as a whole and of the phase converter under the same conditions.

The Norfolk & Western Electrification

The First Month's Service of This Important Installation Has Demonstrated the Complete Success of the Single-Phase Contact System in Combination with Three-Phase Locomotives Having Rotary Phase-Converters —Train Loads of 3250 Tons Are Handled Up 2 Per Cent Grades at 14 M.P.H.

During the past month regular operation on the electrified division of the Norfolk & Western Railway has been inaugurated under thoroughly successful circumstances, an outcome that establishes one of the most important forward steps in the progress of electrification of steam railroads. The installation, which has been mentioned from time to time in these columns, is unique in its combination of the inexpensive and efficient single-phase overhead contact system with the rugged three-phase motor for the locomotives.

The electric zone is located on the main line where it passes through the coal fields in the southern part of West Virginia, extending from Bluefield to Vivian, a distance of about 30 miles. The line is double track throughout except in the Elkhorn tunnel, and there is a large mileage of third-track, passing sidings, branches into the coal workings along the line, and yard trackage. The grades are heavy, and fully 60 per cent of the line is on curves, the maximum being 12 deg. Primarily, the traffic consists in collecting loaded coal cars from the mine sidings and yards, and transporting them up the grades and over the summit of the mountain range to the general classification yard at Bluefield, a division point for the railway. From Bluefield, after classification, the cars are shipped east to the various destination points, chiefly to the railway company's marine shipping pier at Norfolk, Va. All coal traffic originates west of Flat Top, a station about 6 miles east of the mountain summit. Coal shipments to the east constitute the chief load to be handled electrically, but some coal originating east of the summit is shipped to the west, and this also is hauled by the electric engines to the yards near the west end of the electric zone.

There are numerous colliery sidings throughout the coal fields and the service includes the delivery of empties on the return trip as well as the collection of loaded east-bound cars. The electric zone is, therefore, practically a local switching and short-haul division between the coal fields and Bluefield, and it is operated to a large extent independently of the other traffic on the main division. In addition to the heavy tonnage of coal trains, however, through merchandise freight and passenger traffic over the electric zone is helped up the grade by the electric locomotives which are used as pushers, the steam locomotives remaining at the head end.

These conditions are especially favorable to electric traction because trains may be dispatched at fairly uniform intervals throughout the day, thus imposing a fairly uniform load on the power system. At the same time the full service is handled with a moderate number of locomotives, each one of which is able to make several round trips in each day.

Traffic Conditions Improved by Electrification

The purpose of the substitution of electricity for steam was to increase the capacity of the line by materially reducing the time required to handle trains, and

NORFOLK & WESTERN ELECTRIFICATION—SINGLE LOCOMOTIVE COUPLED TO TONNAGE TRAIN

also to provide a more economical and efficient service over the heavy grades. To this end the electric locomotives were designed to handle the heavy freight trains up the grades at the high running speed of 14 m.p.h. as compared with about 7.5 m.p.h. under steam operation. A further saving in time is effected by the elimination of the delays that were experienced by steam trains because of their occupation of the tracks while the two or three locomotives coupled to each train took on coal and water, one at a time, at the several coal and water stations on the grade. The effect of increased speed is especially marked at the single-track Elkhorn tunnel. This is 3000 ft. long and is on a 1.5 per cent grade. Under steam operation it had been necessary on account of the requirements of ventilation to reduce the up-grade speed in the tunnel to about 6 m.p.h. This involved a time interval of seven minutes for clearing the block that included the tunnel. Under electric operation, however, the movement is made in about three minutes.

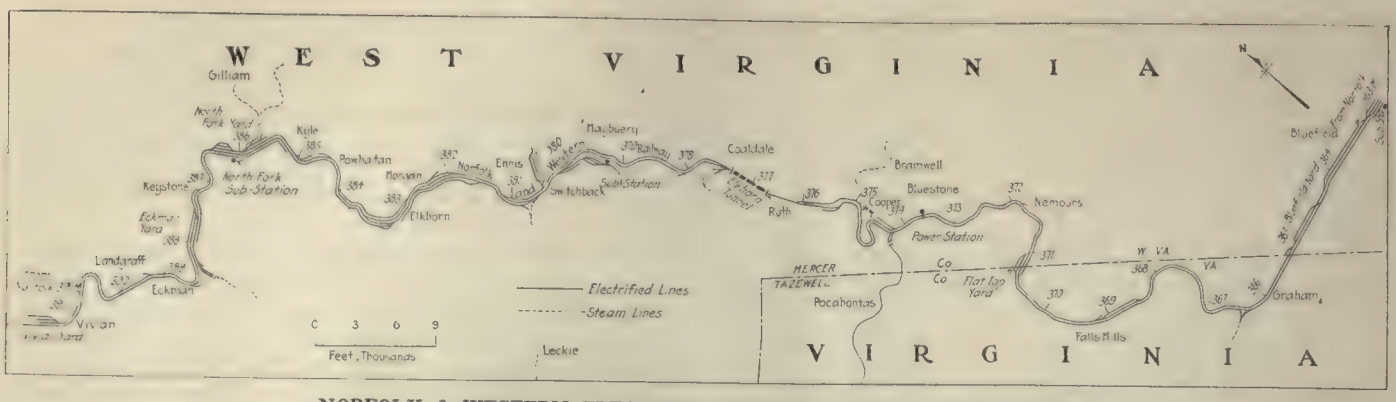
The coal trains handled in this service weigh 3250 tons and were formerly hauled up the grade by three steam locomotives. Two of these, a road engine and a helper, were used over the entire division. The third engine, located at the rear, served as a pusher up the 1.5 per cent and 2 per cent grades, and was cut off at the summit, all of the steam locomotives being of the highly developed, heavy, Mallet type fitted with mechanical stokers and superheaters. Under electric operation a single road engine is used over the electric division and a second electric engine is used as a pusher up the heavy grades. One electric engine, therefore, takes the place of two Mallets over the division, and two electric engines take the place of three Mallets up the grade. In a recent test a 4800-ton train was hauled over the division by three electric engines, two of which acted as pushers. In all cases the electric locomotives handle the trains at approximately double the speed obtained with steam. On the 9-mile grade between Cooper and Graham, where the maximum rise is 0.4 per cent and some stretches are level, the speed of the electric locomotives is 28 m.p.h.

The electric installation has been designed for handling a daily total of twenty eastbound trains, or 65,000 tons, over the division, but ample provision has been made for additional traffic and extensions of electrified tracks when required. At the present time the number of tonnage trains handled daily is about twelve, and pusher or helper service is also provided for all of the through-freight and passenger trains.

In addition to the direct advantages and the economies resulting from the electric train service, the presence of an adequate and efficient power supply has permitted the electrical operation of various auxiliary plants in the vicinity. Thus, a large steam pumping station at Bluestone for the water supply for steam locomotives has been shut down and the pumping is done at the electric power station located nearby. Also the fans for ventilating the Elkhorn tunnel will now be driven by electric motors, and ultimately electric power will be used for operating shops and pumps at Bluefield as well as at several other points on the division.

Although the electrification of this division had long been under consideration, the actual decision to electrify was not reached until about three years ago, when the lay-out and design of the entire installation was worked out in all details by Gibbs & Hill, engineers for

NORFOLK & WESTERN ELECTRIFICATION—VIEW OF POWER HOUSE AND COOLING POND, WITH REPAIR SHOP AT EXTREME RIGHT



NORFOLK & WESTERN ELECTRIFICATION—MAP OF ELECTRIC ZONE

the railway company. All construction, excepting the power house and repair shop, and some of the power-station equipment, was carried out by a specially organized railroad force under the supervision of the engineers.

Single-Phase-Three-Phase Locomotives

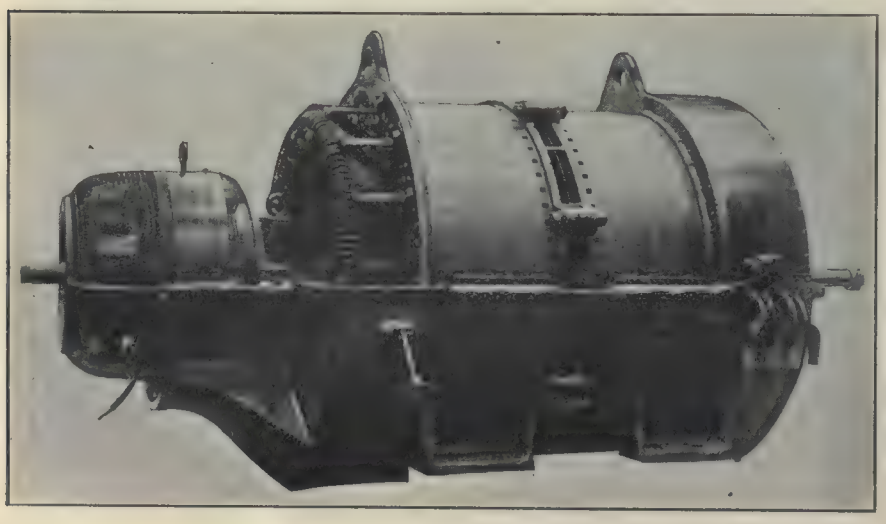
Probably the most interesting of the many striking features of the installation is the Baldwin-Westinghouse, single-phase-three-phase locomotive. The traffic on the electric zone is handled by twelve of these machines each consisting of two 135-ton units or halves so that the total locomotive weight is 270 tons.

In the case of the Norfolk & Western electrification the train weights are so great that it is obviously necessary to have part of the motive power at the rear in order to avoid excessive strain on the draft rigging of the cars. However, the trains are of such great length that there is difficulty in signaling from the locomotive at the head end of the train to the one at the rear, and thus the locomotives are subject to treatment which would be considered impossible in ordinary service. For example, it is not unusual for the rear locomotive to receive a signal to go ahead one full minute or even more before the head locomotive has come into action. In consequence, the rear locomotive will stand still during this period, although it is exerting full tractive effort in an endeavor to start the train. This condition arises most frequently when the rail is wet and permits slipping the drivers, or when the air brakes do not release promptly. Under such circumstances, the train must frequently be allowed to drop back a little and the attempt to start must be repeated. Also, when a train on an up grade comes to a stop the head engine will shut off power and will apply the brakes while the rear engine keeps pushing the train until its tractive effort is exceeded by the bunching of the front cars.

Ordinarily, these requirements would involve exceedingly careful handling, but the locomotives have been designed especially to meet these severe conditions so that their manipulation does not even involve especial attention. The rugged construction of the three-phase induction motor, with its freedom from commutator troubles, together with the liquid rheostat that is installed on the locomotive, is of the greatest importance in meeting these conditions. The rheostat not only gives the smoothest possible gradation of tractive effort, but the latent heat of the steam that is generated within it makes possible the dissipation of an extraordinarily large amount of heat without difficulty. It may be said also that the inherent characteristics of the induction motor enable the locomotives automatically to hold the train at a constant speed without the use of brakes on descending grades by regenerating and returning power to the line. This is accomplished without additional or complicated apparatus. Conditions are such that full advantage of this form of braking can be secured, in that the trains are very heavy, the grades are severe, and the speed relatively high. In actual service the performance of this feature of the installation has proved to be highly satisfactory, the heaviest train being handled down the mountain grade by a single locomotive at a uniform speed of about 15 m.p.h. with the air brakes held in reserve to bring the train to a standstill when desired.

Features of Design

Each unit or half locomotive has two main trucks connected by a Mallet-type hinge, and each main truck has two driving axles included in a rigid wheel base with a radial, two-wheel, leading truck. The buffing and pulling strains are transmitted through the main truck frame and through a twin draft rigging mounted on the main truck at each end of the unit. The cab is of the box type and is supported on the main truck



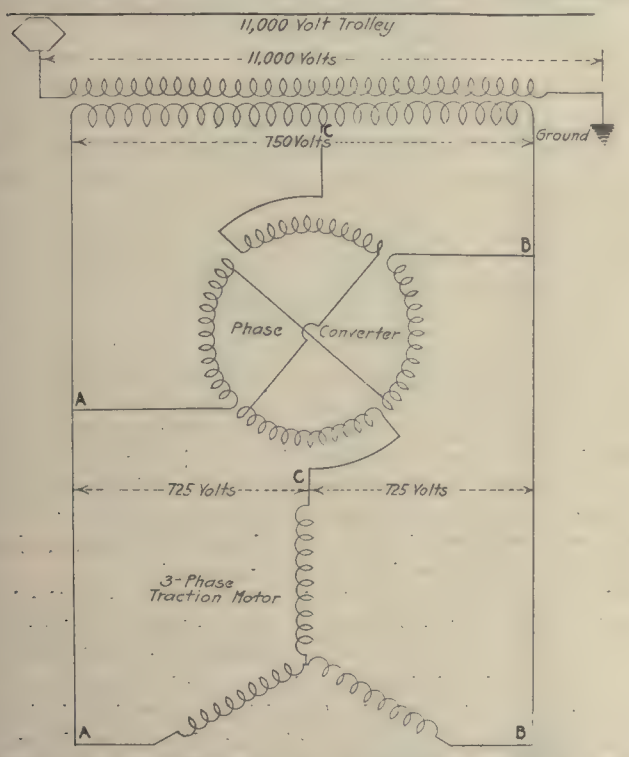
NORFOLK & WESTERN ELECTRIFICATION—PHASE CONVERTER AND LIQUID RHEOSTAT

entirely by spring cushion friction plates and there is no weight on the center pins, which serve only to maintain the cab in its proper position on the truck. An engineer's compartment is provided at one end of each unit, the two units being so coupled as to provide for operation from either end of the locomotive.

Each locomotive has eight pairs of drivers connected in pairs by side rods to a jack shaft between the two wheels. Each jack shaft is driven by two motors geared to it so that the locomotive has eight traction motors. These are of the three-phase induction type with wound secondaries and with field-windings arranged for four-pole and for eight-pole operation. They are ventilated by forced draught, the air being supplied from the main ventilating duct which also delivers cooling air to the phase converter and to the cooling towers for the liquid rheostat.

Provision is made for two running speeds, respectively 14 and 28 m.p.h. When the locomotive is starting, resistance is inserted in the secondary circuit of the motors by means of the liquid rheostat, the amount of resistance being varied by hand at the controller. For the 14-m.p.h. speed all motors are connected in parallel, and the eight-pole combination is set up for each one. For the 28-m.p.h. speed the motors are also connected in parallel, but four of the poles of each motor are cut out, thus doubling the synchronous speed. The locomotives are equipped with the unit-switch type of control and are arranged for the simultaneous operation of the two units from the control end of either one.

The single-phase current collected from the 11,000-

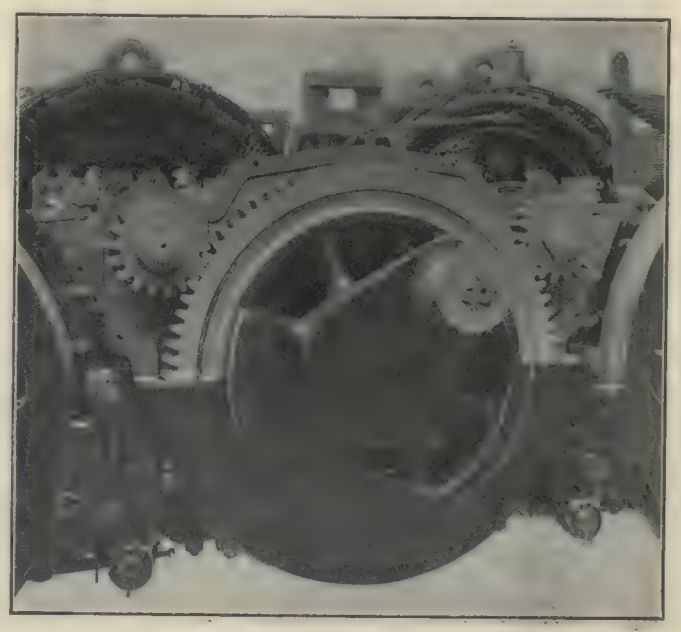


NORFOLK AND WESTERN ELECTRIFICATION—DIAGRAM INDICATING CONNECTIONS FOR PHASE CONVERTER AND TRACTION MOTORS

volt line by the pantograph is fed through an oil-type circuit breaker to the main transformer. The phase-converter, which changes the single-phase current to the three-phase form, is connected to the low-tension side of this transformer, and it operates constantly when the engine is in service. To the extended shaft of the converter are coupled a ventilating blower for the motors and transformers and an air-compressor for the train brakes, the latter being connected through a clutch.

THE PHASE CONVERTER

The phase converter is a single-phase induction motor with a short-circuited, squirrel-cage rotor, or secondary and with two primary windings on the stator. One of these windings is connected across the secondary of a transformer, and when the rotor is running there is generated in the second winding an emf of 90 deg. phase displacement from that of the secondary of the stationary transformer. The use of this device in railway work



NORFOLK & WESTERN ELECTRIFICATION—MOTORS, GEARS AND JACK SHAFT ON LOCOMOTIVE

is so novel that a review of the fundamental principle may be of interest before the other design details are taken up.

Any polyphase induction motor will operate as a single-phase motor on one phase of a polyphase circuit if the motor is brought up to its "pick-up" speed by some external or internal means. Thus if one wire of an operating two-phase motor is broken, leaving but one phase in action, it will continue to run. Moreover, a voltmeter, applied to the open primary winding will show a voltage practically equal to that in the line from which it was disconnected. The motor is, therefore, performing two functions, motor and phase transformer or converter. The reason why it does so is as follows:

Consider first that the motor is operating normally on the two-phase circuit. The two-phase magnetizing current produces a rotating magnetic field which, cutting the secondary conductors (cage-wound or phase-wound) generates emf and currents therein. The latter react upon the magnetic field and produce torque. The rotor maintains a speed slightly below the rotating speed of the field (synchronous speed), the difference or "slip" varying slightly with the load.

If a primary lead is opened with the motor running, as suggested above, there is only single-phase magnetizing current available. By transformer action, however, this produces in the rotor conductors surrounding the magnetic field a single-phase secondary current. At the same time the motion of the rotor conductors in the single-phase magnetic field produces emf and another current phase displaced 90 deg. from the first. Thus there are two rotor currents in phase quadrature and in different parts of the rotor winding. The speed-generated current acts as a second magnetizing current and, combined with the magnetizing current from the line, produces a rotating field, just as when the machine was operating as a two-phase motor. In this field the

NORFOLK & WESTERN ELECTRIFICATION—CROSS CATENARY USED FOR YARD TRACKS

rotor produces torque and will carry a mechanical load satisfactorily.

This rotating field cuts the open primary winding of the motor and generates in it an emf in quadrature with the line emf. From this winding current can be drawn as from the secondary winding of any transformer. It and the line current, taken together, form a two-phase current. A three-phase current can be generated in a similar manner.

In the diagram on page 1061, showing the connections used in the Norfolk & Western locomotives, a two-pole phase converter as described is diagrammatically represented with the rotor omitted, as the function of this is inductive only, as explained. The diagram also shows the familiar T-connection used to produce three-phase from two-phase current. One terminal of the quadrature winding is connected at *C*, at or near the center of the stationary transformer secondary winding. The converter winding is so designed that the voltage between *C* and *C* will be sufficient to produce equal voltages, equally displaced in phase, between *A* and *C*, *C* and *B*, and *B* and *A*. Thus three-phase current is provided for the traction motors. By this arrangement it is necessary only to convert a portion of the current used in the main motors as a large part comes directly from the main transformers.

For starting the rotor a single-phase, series, commutator-type motor is mounted directly on the converter shaft. The converter is forced ventilated, having a connection at its center to the main ventilating air duct of the unit.

Other Locomotive Details

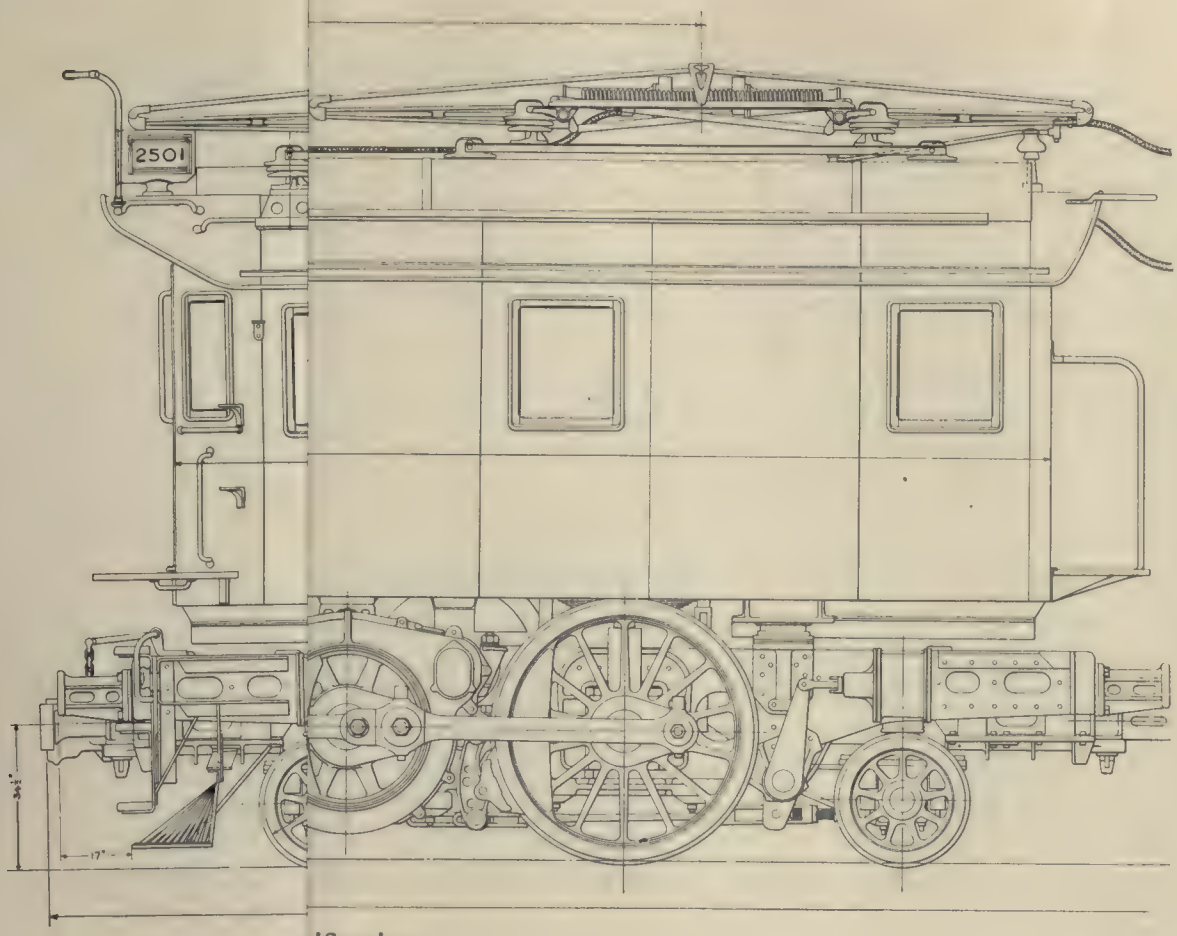
Two pantographs are mounted on the roof of each half-locomotive. These are unique in that they have been arranged to be fitted if necessary with end horns which will automatically fold in when the pantograph is lowered by the tunnel trolley wire, and in this way the unusually wide sliding surface will accommodate itself to the restricted tunnel clearances.

There are four liquid rheostats on each half-locomotive, one for each motor. These are operated in pairs, each pair having in common one storage reservoir and cooling tower, one circulating pump and one operating mechanism. The essential elements of each rheostat include a cast-iron tank in which are mounted electrodes consisting of certain metal plates connected to ground. A hollow plunger is located at the center of the tank for regulating the height of the liquid and this is raised or lowered by an operating mechanism. There is also a motor-driven centrifugal circulating pump by which the liquid is continuously circulated to prevent excessive heating. This forces the liquid up through the bottom of the tank and over the top of the hollow plunger when the plunger is raised, and back through the inside of the plunger to the storage reservoir.

When the liquid is raised so as to submerge the lower ends of the plates, current may flow between the motor-connected plates and the adjacent ground-connected plates, the circuit between the three phases of the motor being thus established. The higher the liquid rises on the plates, the lower the resistance becomes. When the plates are entirely submerged, the liquid going all the way up, the resistance is reduced to the minimum.

To keep the temperature of the circulating liquid as low as possible, a portion is by-passed through a cooling tower containing a series of trays so arranged that the liquid will flow over them in a thin sheet and be cooled by air from the main ventilating duct to which the towers are connected.

This main ventilating duct is supplied by a 36-in. Sirocco fan mounted on the shaft of the phase converter. It is built into the cab floor under the deck, and runs lengthwise through the cab, being arranged with openings at various points where connections are made to the traction motors, converters, cooling towers, etc.



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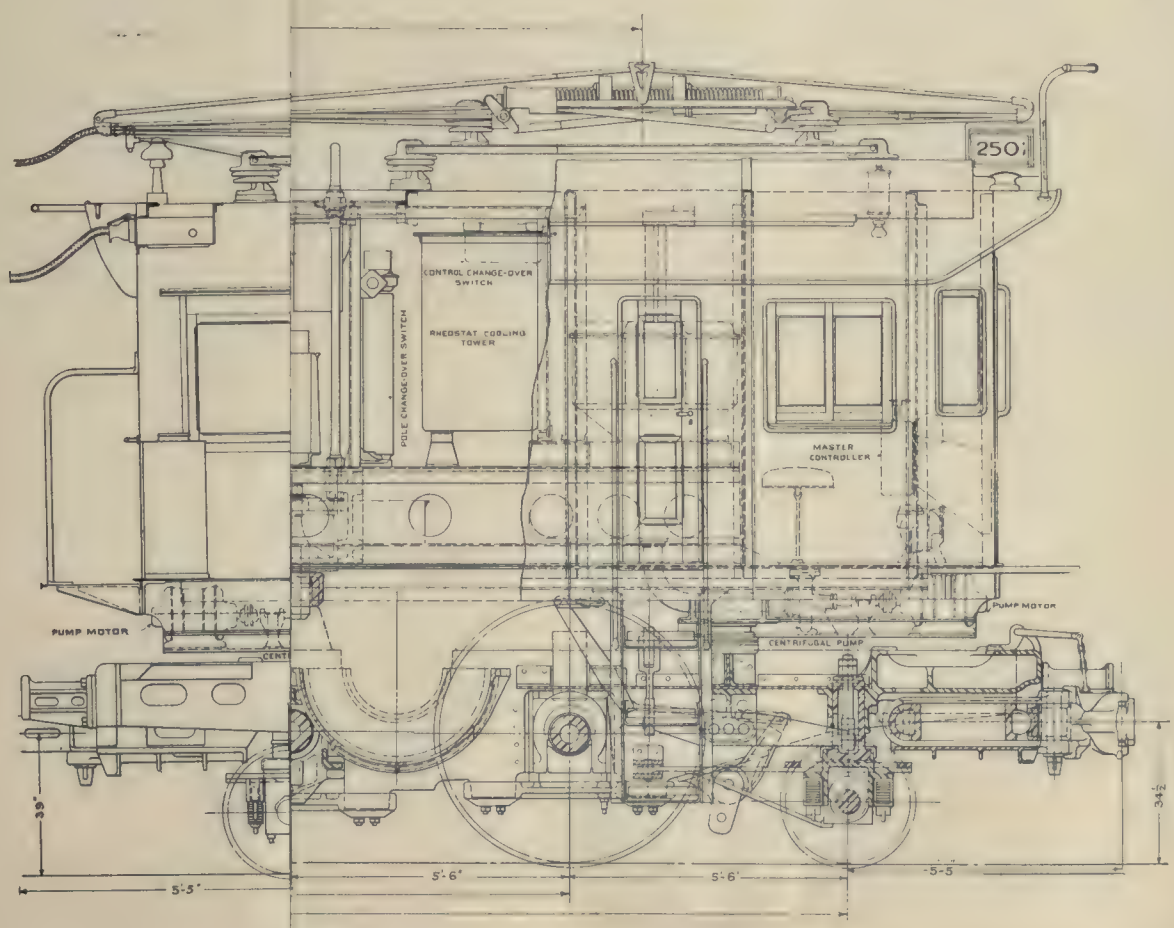

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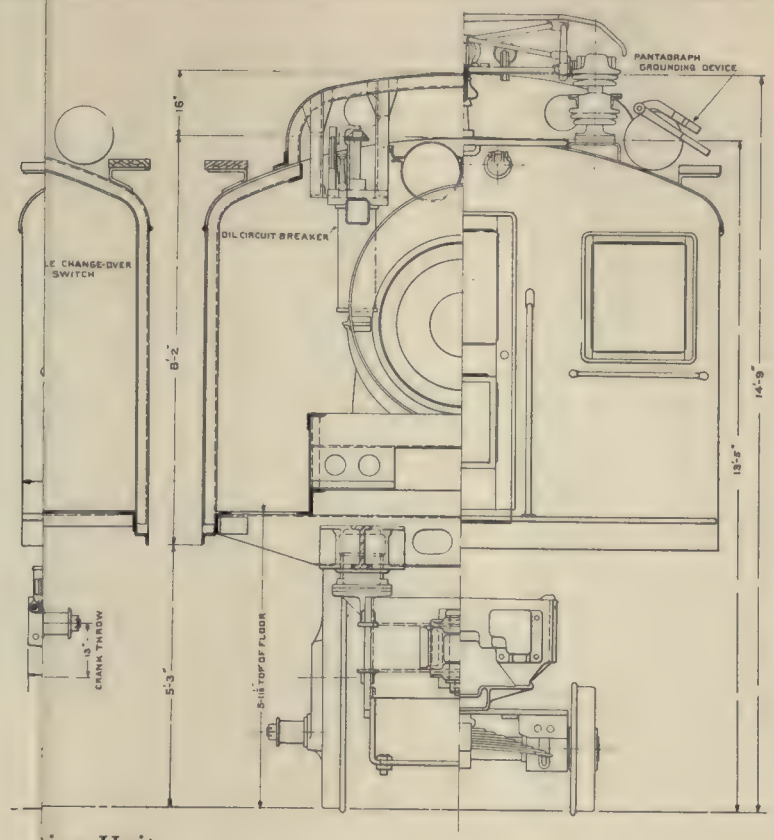

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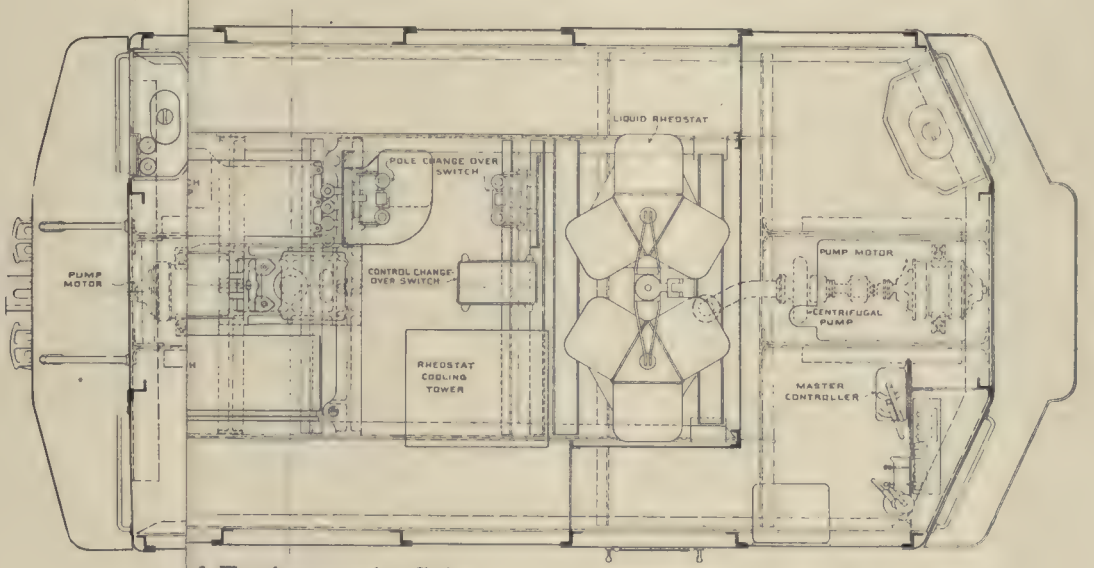

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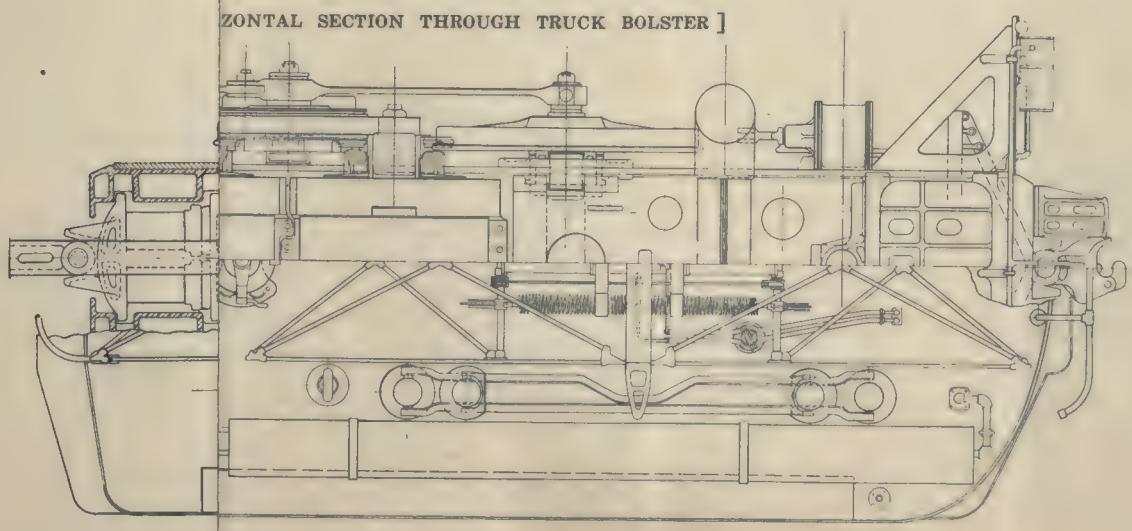
ZONTAL SECTION THROUGH TRUCK BOLSTER]



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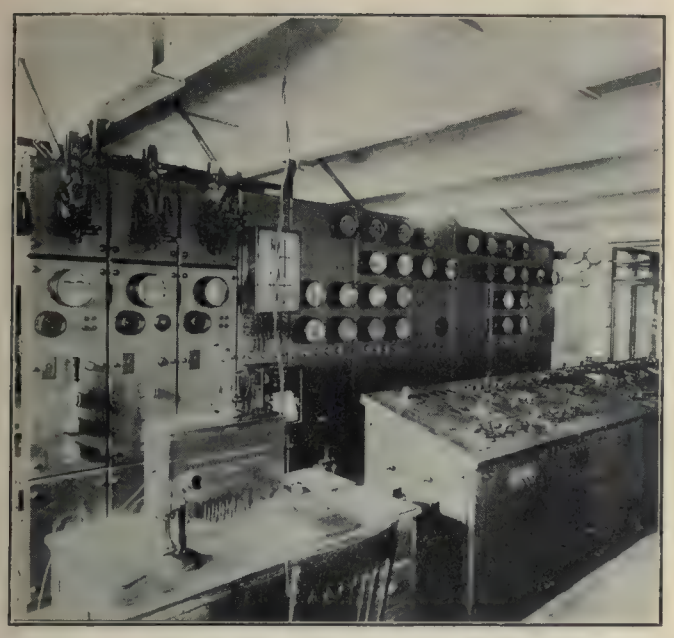
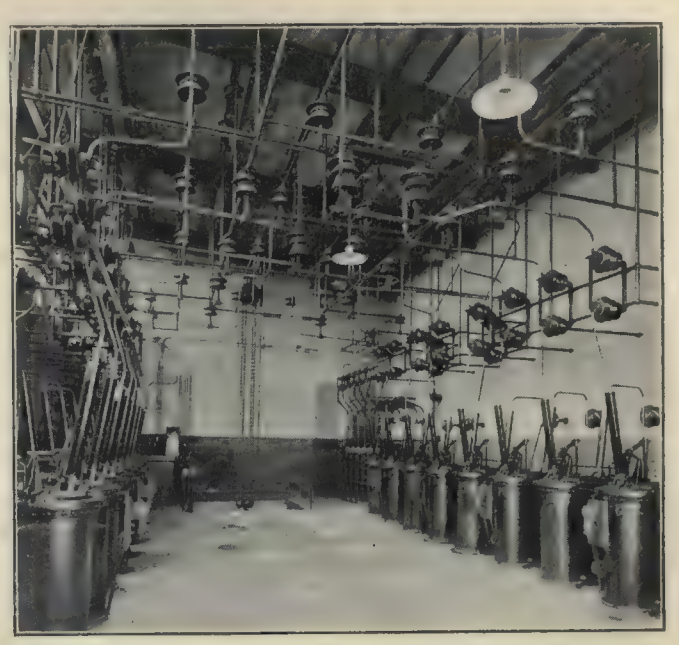


NORFOLK & WESTERN ELECTRIFICATION—TELEPHONE SET AND OPERATORS' BENCH BOARD IN POWER HOUSE



NORFOLK & WESTERN ELECTRIFICATION—INTERIOR VIEW OF HIGH-TENSION SWITCH ROOM

Table I shows the principal dimensions and weights of the complete locomotive:

TABLE I—PRINCIPAL DIMENSIONS AND WEIGHTS OF COMPLETE LOCOMOTIVE

Length over all	105 ft. 8 in.
Driving wheelbase, total	83 ft. 10 in.
Rigid wheelbase	11 ft. 0 in.
Truck wheelbase	16 ft. 6 in.
Height, rail to pantagraph (locked)	16 ft. 0 in.
Height, rail to top of cab (maximum)	14 ft. 9 in.
Width over all (maximum)	11 ft. 6¼ in.
Width over car body	10 ft. 3 in.
Diameter of driving wheels	62 in.
Diameter of pony wheels	30 in.
Weight on drivers	220 tons
Total weight of locomotive	270 tons

The performance of the locomotives under varying conditions of load is indicated by the ratings shown in Table II. However, on tests and in service the locomotives have developed a drawbar pull considerably in excess of the guaranteed maximum, the highest record with the dynamometer car being 180,000 lb. This corresponds to an adhesion of about 40 per cent.

TABLE II—LOCOMOTIVE PERFORMANCES UNDER VARYING LOAD CONDITIONS

	Train on 1.5 and 2 per cent grades	Train on 1 per cent grades	Train on 0.4 per cent grades
Weight of train—tons	3,250	3,250	3,250
Locomotives per train	2	1	1
Approximate speed, miles per hour	14	14	28
Drawbar pull per locomotive, pounds:			
Uniform acceleration	91,800	114,000	79,400
At speed on 2 per cent grade	75,400	.....	.....
At speed on 1 per cent grade	.....	85,800	.....
At speed on 0.4 per cent grade	.....	.....	4,600
Maximum guaranteed accelerating tractive effort per locomotive	133,000	133,000	90,000
Approximate maximum guaranteed horsepower developed by motors	5,000	5,000	6,700

POWER STATION

The power station at Bluestone that supplies power to the locomotives is of the usual type, using steam boilers and turbines for the prime movers. It is located on the Bluestone River about 11 miles west of the town of Bluefield. This site was chosen because it had almost the only available supply of water for boiler-feed and condensing purposes in the district and because the railway company had already constructed a dam and reservoir at the point for a water supply for its steam locomotives.

The plant is equipped with ten Babcock & Wilcox Stirling-type boilers, each having 6772 sq. ft. of heating surface. These operate at 200-lb. steam pressure with 150 deg. superheat. Coal is handled mechanically by conveyors built by R. H. Beaumont & Company, and ash-handling equipment furnished by the Shepard Crane & Hoist Company is installed. Westinghouse underfeed stokers are provided, these having capacity for the actual evaporation of 9 lb. of water per square foot of heating surface. Forced draft is supplied at a static pressure of 6 in. of water, the three fans being of the Sturtevant multivane type geared to 300-hp turbines. A 250-ft. x 20-ft. brick stack is provided also. The heaters are of the open type, and the feed pumps are centrifugal and turbine-driven, the exhaust from these and other auxiliaries going to the heaters.

The main units are three 10,000-kw Westinghouse double-flow reaction turbines operating at 1500 r.p.m., and provision has been made for the future installation of a fourth unit. The generators are designed for 11,000 volts and twenty-five-cycle current with a twenty-four-hour rating of 10,000 kw. A five-minute overload capacity of 25 per cent is provided, the ratings being based on 80 per cent power factor. The fields are of the two-pole revolving type designed to operate under a temperature rise of 60 deg. Cent., but they are capable of withstanding a temperature of 150 deg. Cent. without injury.

The generator armatures are designed to withstand a temperature of 90 deg. Cent. and are wound for three-phase current. Thermo-couples are embedded in the armatures, and these furnish continuous temperature records. Separate excitation is provided by two steam-driven units and one motor-driven unit, voltage regulation being effected by a Tirrill regulator.

The condensers are of the jet type with LeBlanc turbine-driven air and circulating pumps. Steam from the exhaust of these pumps is turned into the condenser automatically when the supply of exhaust steam from the other auxiliaries in the plant is more than sufficient for the feed water. A spray cooling pond has been installed on account of the muddy condition of the Bluestone River during certain seasons of the year. In addition, a reservoir has been provided by damming the river, and when the river water is clean it is circulated through the reservoir for a total distance of 1400 ft., thus permitting the shutting down of the spray nozzles. The pond may be drained by gravity through a sluice gate discharging below the dam.

Switching arrangements are provided in the usual operating galleries. The main 11,000-volt bus is sectionalized and three-phase power for auxiliary purposes is taken from it. No brick or concrete bus compartments are used, the bus being of copper tube carried on insulators mounted on a pipe frame work. Copper tubing and bare wire are used wherever possible, insulated wire being installed only where conductors are carried in conduit, the Fibre Conduit Company's product being largely used for this purpose. The generator voltage of 11,000 for one of the phases is raised to 44,000 by step-up transformers, the 44,000-volt bus being sectionalized, and two high-tension feeders are taken from each side of this for feeding the substations. The usual equipment of Pyrene fire extinguishers is distributed throughout the building.

Regenerative Loading Rheostats

Excess regenerated power from locomotives on downgrades that is returned to the power house passes through the 11,000-volt bus through the various transformers back to the generators if the generators are running under very light loads. If no other load should be provided the regenerated power would reverse the generators and operate them as motors, and to prevent this a loading-device, consisting of electrodes immersed in the intake canal, is provided, this being controlled by suitable switches.

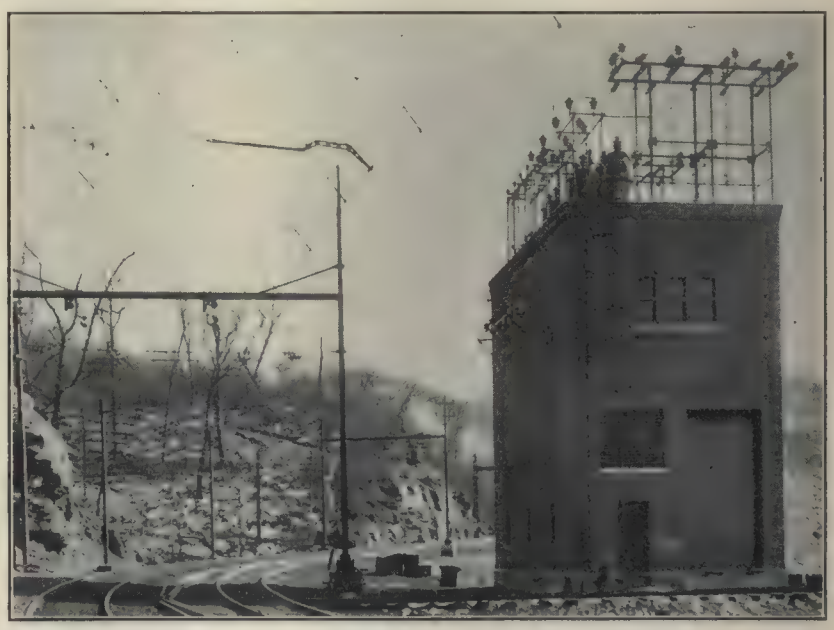
The operation of the switches is made automatic by means of a group of relays and magnetic switches, current transformers, etc., so connected as to give the following results: When the amount of excess regenerated power reaches, say, 300 kva, the closing relays throw in one water rheostat on the 11,000-volt bus. As soon as the regenerated power exceeds the capacity of one water rheostat by 300 kva another closing relay throws in the second water rheostat on the 11,000-volt bus. The difference between the amount of excess regenerated power and the capacity of the water rheostats in service is made up by the generator.

When the excess regenerated power has become reduced to zero with one rheostat in service and all of the rheostat load is supplied by the generators, one of the tripping relays trips the circuit breakers and this cuts the rheostat off from the 11,000-volt bus. With two rheostats in service when the excess regenerated power drops to 2000 kva one of the relays opens the breaker which was closed first and cuts one rheostat out of service, the other rheostat remaining in until the excess regenerated power drops to zero, when this, too, is cut out of service.

The water rheostats are located outside of the transformer house at the power station. Each consists of a steel cone carrying a lead from the circuit breakers and a 6-in. iron plate located at the bottom of the intake canal and grounded to a copper plate embedded in the earth outside of the canal. The power-dissipating capacity is adjusted by varying the distance between the cone and the iron plate. The cone is raised or lowered in the water of the canal by means of a hand-operated winch and cable carried on a steel bracket across the canal.

Transmission System and Substations

High-tension power is transmitted at 44,000 volts, twenty-five cycles, single phase. The wires are carried on catenary supports except in the tunnels, where the line goes above ground over the summit. There are two single-phase lines, each of which consists of four No. 00, seven-strand, hard-drawn copper wire. A 3/8-in. steel ground wire is carried on the poles for the length of the line.



NORFOLK & WESTERN ELECTRIFICATION—WATER RHEOSTAT AT POWER HOUSE FOR DISSIPATING ENERGY OF REGENERATION—A TYPICAL SUBSTATION

The high-tension insulators are of the four-petticoat, pin type, with a maximum diameter of 12 in., and these are tested at 165,000 volts and at 120,000 volts respectively for dry and wet flashover. Their ultimate mechanical strength is about 4000 lb., applied at right angles to the pin at the wire groove. The poles for the high-tension line over the tunnel summit are of chestnut. At present they carry three arms each having two wires. The two upper arms carry the 44,000-volt wires and the lower arms the 4400-volt signal wires. An 11,000-volt trolley feeder also is carried over the Elkhorn tunnel summit.

The cross-arms on all poles are connected to the ground wire, which in turn is grounded by means of a copper cable terminating in a copper plate at the base of every fourth pole. The high-tension lines are sectionalized at each substation by means of air-break switches on steel structures on the roof.

All power for trains is obtained from transformers which step down the voltage from 44,000 volts to 11,000

volts. These are located at five points on the line and are housed in suitable buildings except at West Vivian, where the apparatus is of the out-door type and unhoused. The primary reason for the out-door type of substation at this point is that the desirable and proper location for the building when the electrification is extended would be several miles west of the present location. Therefore the present arrangement is considered only temporary. One of the substations is located in the transformer and switching house of the power station, because the objectionable conditions which would result from short-circuits made it undesirable to feed the nearby sections of trolley lines directly from the 11,000-volt generator bus in the power house. The substation buildings are all of the same type as shown on one of the accompanying illustrations.

No attendants are required in the substations because the oil circuit breakers are remotely controlled from adjacent signal towers or passenger stations or from yard masters' offices. The location of the various substations together with their equipment is as follows:

Bluefield, two 3000-kva units.
Bluestone (power house), two 2000-kva units.
Maybeury, two 5000-kva units.
North Fork, two 3000-kva units.
Vivian, one 2000-kva unit.

The total capacity of all substations is 28,000 kva. All of the transformer units are of the Westinghouse, single-phase, oil-insulated, waterproof type, the water for cooling being taken from the company's pipe line. They are equipped with thermostats which close a bell alarm at high temperatures, thus giving warning at the operator's office. Two General Electric transformer-oil filter outfits have been provided, one for the power house and one for the substations. The latter is transferred from one location to another as required. Each outfit consists of a filter press, drying oven and motor-driven centrifugal pump, and has a capacity between 7 gal. and 10 gal. of oil per minute.

Catenary Supporting Structures

In the distribution system no supplementary feeders are required as the power supply is effected entirely by means of the contact lines. For supporting these two distinct types of structures are used. The one on the main line has wires suspended from overhead beams, and the other, which is used only in the yards, has an overhead cross catenary cable to support the longitudinal catenary wires for the several tracks.

A typical main-line structure is shown in the illustration on page 1066. This consists of two tubular steel poles set in concrete foundations and carrying between them a structural steel beam, which is partially supported by means of sag braces extending up to the pole tops. Extensions of the poles above the sag braces support cross-arms which carry the high-tension feeders and the signal lines, and the protecting ground wires are clamped to castings screwed onto the extreme ends of the poles.

On tangent tracks the bridge structure is unguyed, but on curved tracks guys are used at the outside of the curve to take the pull of the catenary system. This design has proved to be very satisfactory wherever there is room on the right-of-way for guying as it is simple and rugged in design, can be readily arranged to give any desired horizontal or vertical clearance, and is easy to erect. The use of sag braces instead of knee braces gives the desired clearance under the beam for the wires, although nothing is added to the height of the pole since it must be extended in any event to carry the high-tension and signal wires. On long stretches of tangent track the cross beams might interfere somewhat with a clear view of the signals, but in the present case there is but little tangent track and no long stretches at all, so that interference with the signal aspects is not noticeable.

The catenary supporting structures are nominally 300 ft. apart on tangent track and somewhat closer on curves. However, many adjustments and compromises in location had to be made on account of existing structures, and the spacing is not rigidly maintained.

Reinforced concrete foundations are used in all cases and a proper ground plate is set in coke underneath one of the two foundations for each structure. A substantial copper cable is carried up through the concrete for attachment to the pole with an expanded pin-type bond terminal. A reinforcing collar of ½-in. plate protects the pole at the top of the foundation.

The poles are made up of pieces of National Tube Company's steel pipe of various lengths, sizes and weights, these being swedged together. They change in size at the height of the cross-beams, thus making a shoulder on which rest the heavy steel castings holding the cross-beam. To these castings also are attached the guy rods when these are used. The poles, during construction, were grouted into cored holes that had been cast in the foundation.

Guy rods, which are attached to anchors of concrete containing two or more pieces of old rail, are provided with protection at the anchor end consisting of a boiler tube filled with grout. The end pieces of the rods are of uniform length, while the closing or middle pieces were cut on the ground during construction to the proper length, the final adjustment being made by means of turnbuckles. In general, double guys are used, the two making an angle of 20 deg. with the pole and being spread at the anchor ends so that they make an angle of about 40 deg. with each other. Structural bridges guyed longitudinally with the track are used where it is desired to anchor or dead-end the catenary system.

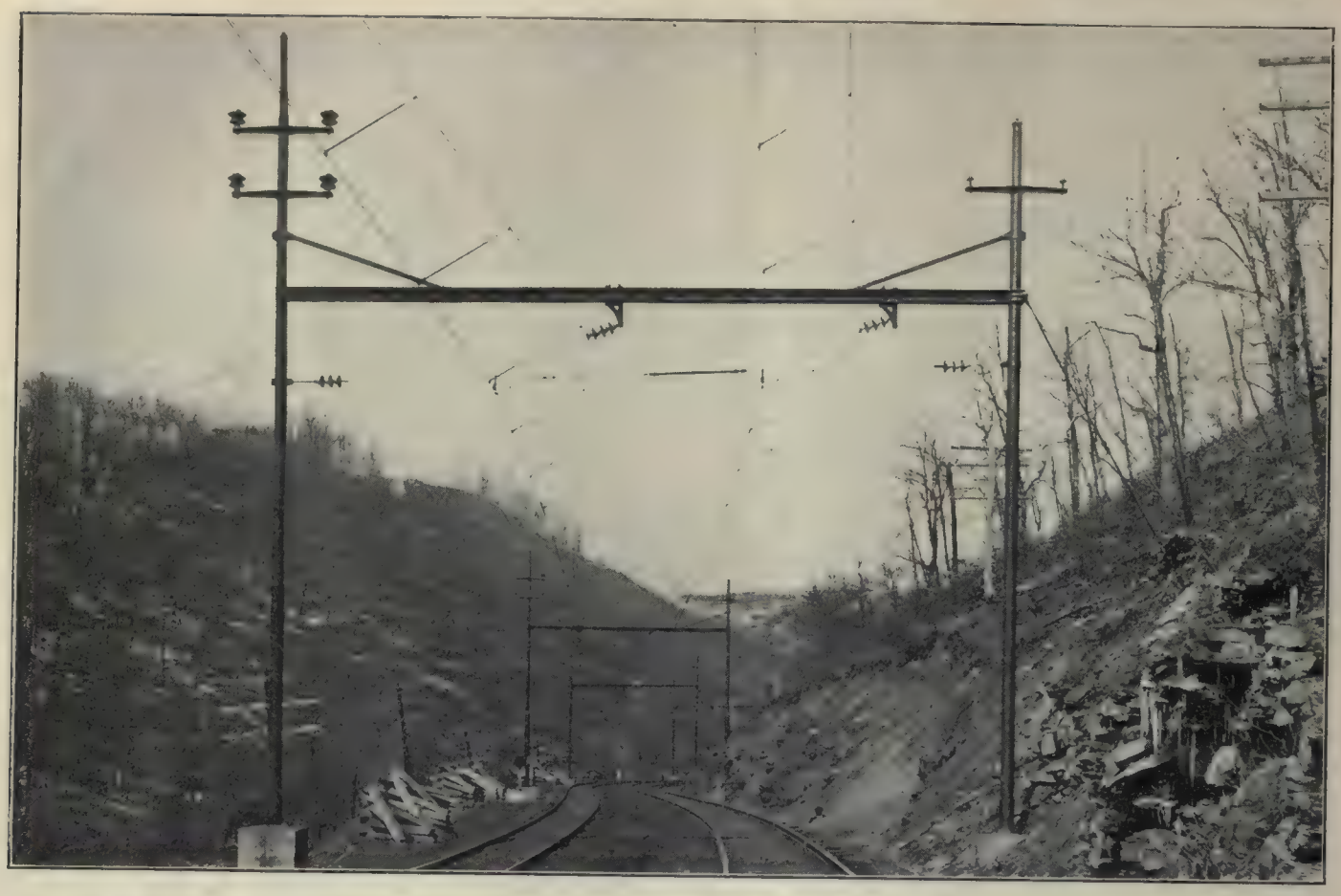
In the yards the catenary-carrying structure consists of two or more high structural-steel posts either guyed or self-supporting, from the tops of which a cross-catenary cable of extra-high-tension, galvanized, steel strand is run across the tracks to support the longitudinal catenaries.

The Catenary System

The catenary system is designed to hold a No. 000 grooved, phono-electric contact wire at a uniform height of 24 ft. above the top of the rails in such a location that it will not vary horizontally more than 12 in. from the center of the track, allowing for super-elevation. Above the contact wire is a horizontal auxiliary messenger wire, and above this is the main messenger wire that supports both of the other wires. In this section of the country the temperature ranges from about 110 deg. to minus 10 deg. Fahr., and this changes the stresses in the wires from almost zero to approximately the elastic limit.

Over tangent tracks the construction is simple. From each supporting structure a steel casting attached to the horizontal beam acts as a support for three suspension-type, Locke insulators. Each of these insulators is of itself good for a working voltage of 11,000, and the three are used as a special insurance against line troubles. The insulators are of porcelain and are 8 in. in diameter, somewhat over 5 in. long, having an ultimate strength of 12,000 lb. Since the initial energizing of the line about the middle of December there has not been a single failure of any of these strings of insulators.

There is attached to the bottom insulator a malleable-



NORFOLK & WESTERN ELECTRIFICATION—TYPICAL MAIN-LINE CATENARY CONSTRUCTION AND TUBULAR BRIDGE

iron casting which supports the messenger wire by being clamped to it. This casting has ample bearing for the wire and also has arcing horns so that in case of an insulator failing the arc would probably be from the casting instead of from the wire. The messenger wire is ½-in. extra-high-tension, galvanized, steel cable having a breaking strength of over 30,000 lb. It is jointed by forged sockets which were especially designed to develop the full strength of the cable. The nominal sag in the messenger wire is 5 ft. in a 300-ft. span, the actual sag, of course, depending upon the particular span.

Spaced at 30-ft. intervals along the messenger wire are bent-strap clips which hold the hanger straps. These latter are of galvanized steel and they are all of different lengths, depending upon the distance from the low point of the messenger wire, the length of each hanger being calculated so that the bottom of all hangers will be the same distance above top of rail. To the bottom of each hanger is bolted a pair of malleable iron trolley clips which, however, on tangent track do not grip the contact wire, but hold only the auxiliary messenger wire. This auxiliary messenger wire is a No. 0 round copper or steel wire, depending on whether the load conditions require the added carrying capacity of copper over steel. The various wires required for the overhead construction were furnished by the Bridgeport Brass Company, the Standard Underground Cable Company, and the John Roebling's Sons Company.

From the auxiliary messenger wire the No. 000 grooved contact wire is supported by a pair of clips bolted together and spaced 15 ft. apart. These are so spaced, however, that they are equi-distant from the hangers holding up the auxiliary messenger wire, and the result is an extremely flexible and smooth-running trolley.

As all calculations were made for an average temperature of 60 deg., the winter temperature increases the tension in all wires and the contact wire rises somewhat in the center of the span. However, even a 6-in. rise in a 300-ft. span makes the trolley gradient of only 0.08 per cent, whereas gradients of even 0.5 per cent are permissible.

Steady strands are used on long tangent stretches. These are insulated from ground by strings of three suspension type insulators, and wherever one of these cross steady strands from pole to pole of a structure attaches to the wires over two or more tracks it is sectionalized between tracks by an impregnated, wood-stick insulator 4 ft. long. The latter are tested to 8000 lb. or largely in excess of the maximum load where they are used.

The trolley is sectionalized longitudinally where necessary by breaking the messenger wire with two parallel strings of three insulators each. Directly below the electrical break in the messenger wire the auxiliary messenger and contact wires are attached with turnbuckles to the ends of a heavy wood insulator. Tee-iron runners are supported from the trolley wires and from the wooden insulators, and as the runners are supported at opposite ends and sides of the insulators they have ample electrical clearance from each other. But since they are of the same elevation and overlapping longitudinally, the pantograph makes contact with the second before leaving the first, so that while the catenary system is sectionalized there is no interruption to the current supplied to the locomotives when they pass the break.

At the section breaks which are provided to permit isolation of parts of the line for repairs, but which are normally connected through electrically, specially-designed disconnecting switches are mounted on top of the wood insulators. These can be opened or closed by means of a long impregnated wooden switch-stick.

At certain locations the catenary system is anchored

NORFOLK & WESTERN ELECTRIFICATION—TYPICAL SIGNAL BRIDGE—PULL-OFF POLE ON MAIN-LINE CURVE

longitudinally, or dead-ended, by being solidly attached to the cross girders of special structural bridges provided to limit the zone of trouble should a wreck or unforeseen accident break a messenger wire. The normal messenger-wire support at the bottoms of the strings of insulators is so designed that in general the messenger wire will slip through. Hence, should a messenger break between anchors it is expected that it will slip through several supports adjacent to the break and distribute the abnormal strain over several bridges instead of concentrating the load on the structures at either side of the break.

Where the track is curved, as it is over the larger portion of the route, the trolley wire must also be curved so that it approximates the track curvature, but the system has been designed within limits such that the contact wire may be 12 in. off the center line of the track in one direction at the bridges or points of support, and 6 in. off the center line of the track in the other direction at the center of the span. This allows the trolley curvature to be less than the track curvature.

On curved tracks the hangers from the messenger wire are 15 ft. apart and the clips at the bottom hold both the auxiliary messenger and the contact wire. This is essential to keep the contact wire and the auxiliary messenger wire in a vertical plane. The holding of both wires by the same clip at the end of the hanger, however, does not result in hard spots in the trolleys. Since all such hangers lie on angles to the horizontal, the whole system is sufficiently free to move vertically under a slight upward pressure of the pantograph, and this assures smooth riding.

To avoid an uneconomically close spacing of structures on sharp curves pull-out poles are used in some cases between bridges. These are single tubular steel poles set in concrete foundations and having single guys of the same type as used on the catenary bridges. To the tops of these poles a wire strand is connected through three of the suspension type insulators to both messenger and contact wire, and this serves to bend the plane of a catenary system.

In the yards the catenary system is, of course, very similar to that on the main line except that only two of the suspension-type insulators are used between live wires and grounded structures. The auxiliary messenger wire is omitted, and the clips at the ends of the hanger straps hold the contact wire in tangent as well as in curve construction. This, of course, makes the contact wire in tangent, yard construction less flexible than where the auxiliary messenger is used, but it gives quite satisfactory results when the speed is low.

In the Elkhorn tunnel special catenary construction was necessary. The tunnel walls are 14 ft. apart at the spring line and 13 ft. apart at the base, the spring line being 11 ft. 1 in. above the top of the rails. The top of the arch is 19 ft. 3 in. high. Extended experiments with insulators and their arrangement were made by the engineers prior to the construction in a sample metal-lined tunnel where high voltages were submitted to the smoke and steam from a locomotive. The arrangement finally adopted was to have a supporting structure every 75 ft., the structure consisting of two cast-iron brackets on each side of the tunnel held to the brick lining by large bronze expansion bolts. Each bracket carries a 44,000-volt, transmission-line insulator. Supported by the pair of insulators on each side of the tunnel is a 2-in. brass pipe parallel to the tracks, and mounted on this piece of pipe is another line insulator upon which rests a cross pipe that is bent to follow the arch of the tunnel. The cross pipe is used as a support for the bronze messenger wire. All line catenary parts have, therefore, double insulation to ground. Notwithstanding the necessarily limited clearance, the overhead construction in this tunnel stood a test of three times the normal trolley voltage, and thus far has performed in a very satisfactory manner for the several weeks that it has been in service.

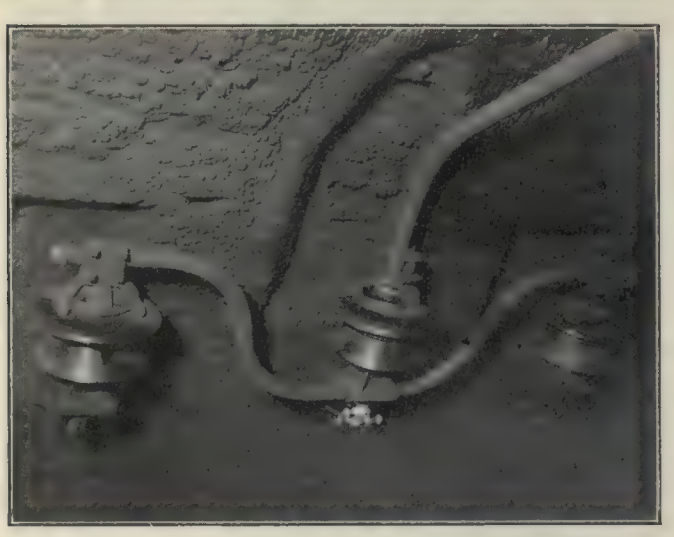
On branches and coal mine sidings a wooden-pole, bracket-type construction is used. In such cases only two of the suspension type insulators are installed. The messenger wire is ⅜-in. steel strand and the contact wire No. 00, no auxiliary messenger being used.

TRACK BONDING

A special type of track bond has been designed for this installation, the construction permitting it to be installed by removing only one bolt in the fish-plate. In this way the bonds may be installed almost as quickly as the exposed type, although they retain all the advantages of the concealed type. The method of installa-

tion requires a bond sufficiently rigid to be passed between the rail-web and the fish-plates so that the cable consists of thirty-seven strands of copper wire, making a bond equivalent to 0.275 in. diameter. As received from the manufacturer the bond consists of a 36-in. cable with a terminal welded on one end, the free end of the cable being tinned only, to prevent the separation of the strands. After the bond has been shoved through under the fish-plates the free socket terminal is soldered in place, and both terminals are expanded into the holes in the rail by means of steel drift pins. These track bonds together with the impedance bonds installed for the signal system were furnished by the Ohio Brass Company, the Electric Service Supplies Company, and the American Steel & Wire Company.

It may be mentioned here that the electrified zone was originally equipped with automatic signals of the d.c. type requiring primary storage batteries, these signals being usually mounted on posts along the track. Under electric operation, however, it was deemed advisable to make use of these signals, which were only recently installed and practically new, on other parts of the railway and to provide new a.c. signals in connection with a.c. track circuits, the signals being mounted on the catenary bridges. This part of the work was carried out by the railway company.



NORFOLK & WESTERN ELECTRIFICATION—CATENARY BRACKET SUPPORT IN ELKHORN TUNNEL

Protection of Telegraph Wires

Electrification made it necessary to move the telegraph pole line which originally had shifted from one side of the track to the other at frequent intervals. This was placed entirely to the north side of the track and at the extreme edge of the right-of-way. Ample clearance was thus provided against danger of physical contact between the telegraph wires and the high-voltage power wires in case the former should break and fall.

To provide against the effect of induction it was decided to place the transformer substations somewhat closer together than would have been required by considerations of voltage regulation and losses and to place the end substations near the ends of the line. This has resulted in feeding each important or long section of trolley from both ends, and in consequence the current fed to the trains in a section between substations goes in both directions in the trolley and track circuits, the induced voltage in parallel telephone and telegraph lines being thus largely localized and neutralized. In addition, however, in order to provide for such disturbances when one substation might be out of service, as well as for the excessively high currents which occur in cases of short circuits and grounds, it was decided to install the so-called "track-transformers," or boosters, in both trolley and track circuits at intervals of about 1 mile.

The track transformers are series transformers having the primary windings connected in series with the trolley and the secondary connected in series with the tracks at the middle points of the impedance bonds which are required at each signal location. These booster transformers are mounted on signal bridges, the track connections being carefully worked out so as not to interfere with the functioning of the signals. They cause the return current, of which a considerable amount would ordinarily leak through the ground, to flow in the track rails so that it is kept at a fixed distance from the trolley wire and the telephone and telegraph wires. The rails and the trolley wire occupy approximately symmetrical positions with relation to the telephone and telegraph circuits, and as the current is flowing in opposite directions in trolley and in track the effect is largely to neutralize the exterior inductive effect. While all of the above provisions were made primarily to protect the company's own circuits which are nearest to the track, they likewise serve to minimize the tendency to induced voltages in the telephone lines of other companies.

There are two sets of coils wound on the core of each transformer, one for the eastbound and the other for the westbound track. Hence only one transformer is required at each point. Since this arrangement has been in service it has been found that the telephone and telegraph service is not interfered with in any way by the operation of the electric trains.

Facilities for Maintenance

A great deal of attention has been given to the provision of adequate facilities for the inspection and maintenance of all parts of the installation. The natural headquarters of the electric zone is at Bluestone, where the power house was necessarily located on account of the water supply, and it was decided to locate the inspection building and machine shop for maintenance of electric locomotives at that point also rather than to try to take care of electric engines at the steam engine shops at Bluefield. The line maintenance force is also located at Bluestone, and is in constant touch with all parts of the electrified section by means of a patrol telephone line having telephones placed at signal bridges in addition to the usual telephone facilities. Thus the general foreman and the foremen of all departments of the electrical maintenance work are located at one central point and provided with means by which constant connection is maintained with all points, including train despatchers, yard masters, and the superintendent and other division heads. To this end the company has provided dwellings for foremen and others on its property near the power house.

The locomotive inspection building is designed primarily for the electric locomotives, but the machine shop provided in connection therewith also serves the power plant, and thus the necessity of installing machine shop facilities in the power station is avoided. The building is 148 ft. by 68 ft. in size and is of the same type as the power station, which is just north of it. There are two main pits running for the full building length and each will hold one locomotive or two units. The pits are substantially constructed of concrete with sloping floors and numerous outlets to provide drainage, and they are equipped with electric wiring for lighting and power purposes as well as with compressed air.

At the west end of the shop is a short wheel-pit

which is connected to the two other pits by means of a covered lateral pit. This pit is equipped with a narrow-gage track to handle the pneumatic jack by which the wheels are removed from the locomotives and are run to the storage track in front of the heavy wheel lathe.

One of the pits is used almost exclusively for inspection, and for this purpose a 112-ft. platform has been located 12 ft. 8 in. above the rails, extending close to the side of a locomotive on the tracks. All repair work is done in the part of the building where the machine tools are located. This part of the shop as well as one inspection pit and the short wheel pit are spanned by a 30-ton Whiting crane. It is equipped with four General Electric motors and two hoists, the main hoist having a capacity of 30 tons and the auxiliary hoist having a capacity of 5 tons. The following machine tools are installed in the machine shop:

Motor Driven Tools

80-in. heavy wheel lathe.
30-in. x 8-ft. planer.
60-in. x 6-ft. horizontal boring machine.
3-ft. Mueller radial drill.
20-in. Stockbridge crank shaper.
73-in. boring mill.
36-in. double-back-geared lathe.

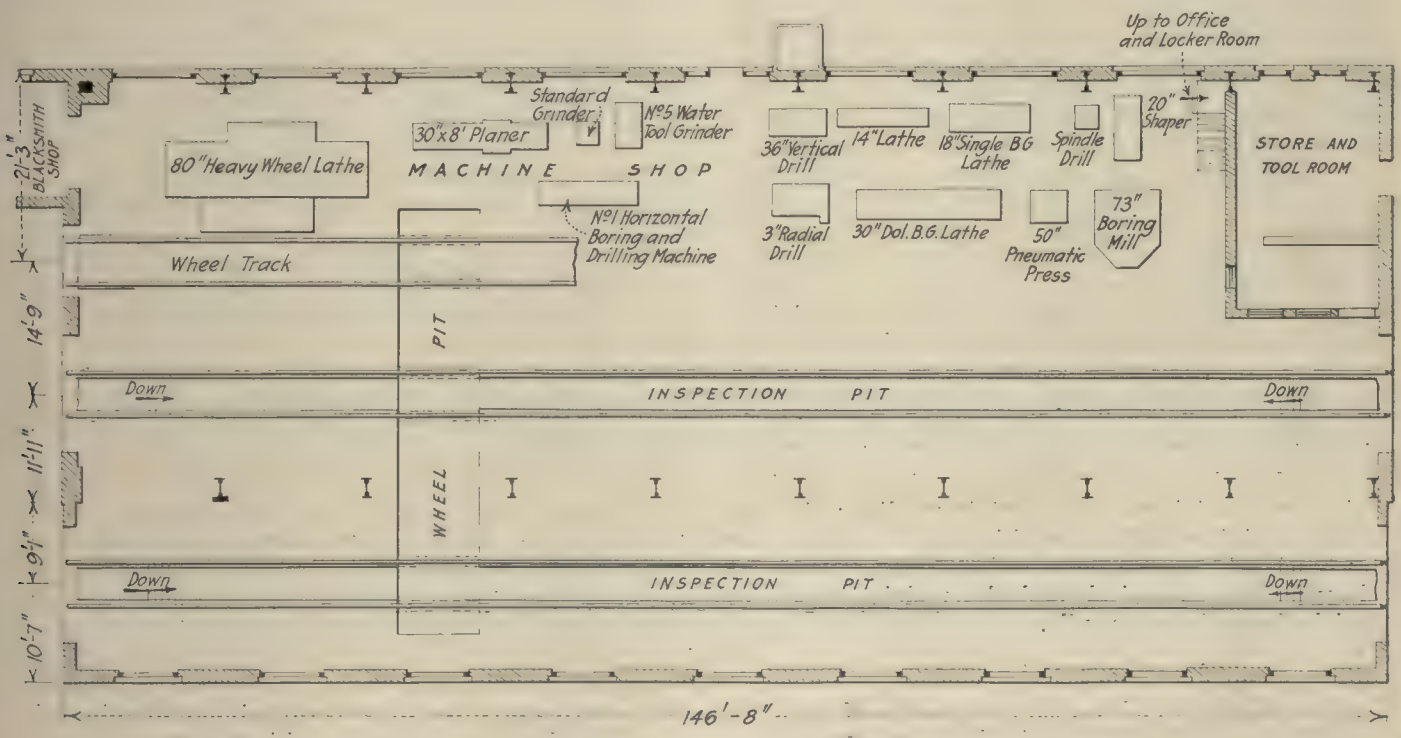
Belt Driven Tools

1 Diamond double emery grinder.
1 Diamond wet tool grinder.
36-in. Aurora vertical drill.
18-in. x 10-ft. single-back-geared lathe.
14-in. Barr two-spindle sensitive drill.
50-ton pneumatic press.

consisting of a tower car, tool car and flat car, which is constantly held in readiness for heavy emergency repairs. The ordinary repairs, however, are taken care of by comparatively small gangs consisting of from three to five men for whom there are provided three small gasoline cars fitted to carry tools and an assortment of wire, insulators, and other repair parts as well as extension ladders.

Wherever possible repairs are made from the overhead bridges or from ladders. In order to avoid interruption to electric service to the greatest extent possible, specially treated and impregnated wooden ladders are provided and these can be used for light repairs to trolley fingers, clips, and other details on the 11,000-volt catenary system while it is alive. Very rigid rules permit the use of only one ladder at one point at any time and only one man is allowed on the ladder. The use of long lengths of wire which might reach across to other wires or to a grounded structure is prohibited. Certain of the line repairmen are regularly stationed at other points from which they can quickly respond to an emergency call by the use of gasoline cars.

The previously mentioned patrol telephone line is installed over the entire length of the electrified section and it has telephones in locked boxes at certain signal bridges spaced about 1 mile apart. This patrol



NORFOLK & WESTERN ELECTRIFICATION—PLAN OF ELECTRIC LOCOMOTIVE REPAIR SHOP

The pneumatic press and the pit wheel-jack were made by the railway company according to their own designs. Pneumatic pressure is used instead of hydraulic because of its extensive use in all buildings for other purposes.

LINE MAINTENANCE EQUIPMENT

A brick building at Bluestone, formerly used as a pumping station for locomotive water supply, is used as headquarters for the line inspection and maintenance force. Here a supply of line materials is carried, and part of the building will be fitted up as a bunk room for line repairmen, who will thus be available and subject to call at any time during the day or night. On a near-by siding is stationed an emergency repair train,

line is connected with the power house and it is valuable for use in reporting either line or locomotive troubles.

Through the telephone operator located at the power house communication can be established with the train despatcher and other officials. The power director is located at the switchboard in the power station, and he is also in constant telephone communication with the signal tower operators, passenger station agents, yard masters, and others who are responsible for manipulation of switches in the substations or along the line. By means of these facilities power can be switched off or on quickly whenever necessary, or the line may be sectioned and service restored in part after interruptions.

Southwestern Association Question Box

Track, Shop, Distribution, Transportation and Management Topics Were Covered in Symposium Form

For the benefit of the members of the Southwestern Electrical & Gas Association, of which the annual meeting was held in Galveston from May 19 to 22, the "Question Box" was issued in pamphlet form in advance of the meeting. The pamphlet contained 125 questions, of which many were of interest to electric railway men, and a number of questions were accompanied by digests of answers received at the association office. The questions and answers of electric railway interest may be grouped under the following headings: Track and roadway, distribution system, shops, transportation and management.

Track and Roadway

The pin terminal bond was recommended in response to a question as to the best method of bonding aside from welding or brazing. The latter should be well protected from corrosion.

The factors which determine the width of "devil strip" in city streets, in addition to the extreme width of car, were stated to be as follows: On tangent track side oscillation, uneven loading and uneven surfacing of track must be considered. Where the railway paves between tracks the cost of paving is also a factor. On curves the elevation of the outside rail of the outside track and clearance for the car overhang are additional factors. While in some cities clearance for persons standing between tracks is provided, this "safety space" is the cause of accidents rather than the preventative.

In regard to the crowning of paving between rails and tracks it was stated that, with T-rails, paving should be crowned slightly between rails, but not with grooved or girder rail. There should never be any crowning between tracks.

Unanswered questions related to screw and driven spikes, relative merits, and best sizes and methods of installing the former; the use of oxy-acetylene in rail bonding; the minimum radius of curve allowable with a single guard rail; the use of asphalt paving blocks against the rail; the proper relation of rail-head and wheel-tread widths; elimination of rail corrugation; building up special work by electric welding; the use of spring-point switches on high-speed, interurban lines; the traffic necessary to render the use of electric track switches economical, and the reclaiming of old materials from the scrap pile.

Distribution System

On the subject of bond testing the recommendation was made that such testing be combined with a general testing of the return circuit when possible. This can be done best when traffic is suspended. In regard to grounding of poles, it is not safe to depend upon a concrete setting of a metal pole for grounding.

A question as to the reliability of sherardizing and galvanizing of trolley wire and line fittings was asked. In reply the secretary explained the processes of coating metal objects with zinc oxide or zinc, stating that zinc oxide makes a non-porous "metallic varnish" which resists corrosion by many acids and alkalies. There are, however, some substances which attack zinc, particularly those carried in seashore air and in coal and gas smoke. In bending and otherwise handling zinc-coated fittings, there is danger of separating the coatings from the fittings, and rust will form under the coatings if the latter are broken. It is advisable to paint fittings, especially such as are subjected to bending or surface abrasion.

Several questions relating to poles and their preservation brought out information as follows: In eastern Texas both treated and untreated native yellow pine poles are used, but in the West, western cedar is the favorite on account of freight rates. Practically all kinds of poles can be economically "treated" without deleterious effect on the wood fiber. Improper manipulation in treating may injure the fiber by overheating or rupturing the cell structure.

Unanswered questions on distribution topics related to splicers for grooved trolley wire, mechanical trolley-wire ears, trolley-wire tension in city and interurban service and concrete poles in city span-wire construction.

Shop Practice

In reply to a question as to the useful life of axles it was recommended that axles be tested after making a mileage which allows a large factor of safety. For this purpose inspection in place is not sufficient but in general the axles must be stripped and thoroughly tested.

Unanswered questions related to the following topics: Results obtained with combinations of different kinds of gears and pinions; experience with roller and ball bearings in high-speed and low-speed service; mileage to be obtained with heat-treated axles; car ventilators; artificial light for car-sheds, pits and shops, and experience with sand-blasting of metal parts of cars.

Transportation

A member asked as to the advantages and disadvantages of street sprinkling. The response was that there are no advantages to anyone concerned. The disadvantages to the railway are the making of slippery rail and soggy road-bed. It is recommended that the water wasted in sprinkling be used in washing the streets.

The discussion on methods for insuring intelligent reading of company notices by employees brought out the need for such methods, but no successful methods were described.

Regarding the possibility of holding conductors jointly responsible with the motormen for the observance of signals, it was pointed out that this would be highly undesirable as the conductor must concentrate on the duties which are peculiarly his own.

The replies on the subject of operating cars during lightning storms were unanimous in favoring such operation providing that suitable lightning arresters are used and the lighting circuits are kept closed.

A question as to the practice of companies as to allowing motor men to be seated while on duty brought out a response stating that motormen are allowed to sit in sections where vehicle and pedestrian traffic is light, providing their own stools for this purpose.

Unanswered questions on transportation related to the following: Possibility of using ordinary single entrance and exit cars in pay-enter service; practice in stopping cars near fire engine houses; relative advantages of near-side and far-side stops; practical results from the use of coasting clocks in city and interurban service; effects on schedules of the use of closed doors and folding steps; best alarm signal for city cars; disadvantages of devices for limiting car acceleration; use of the water jet for removing mud and leaves from rail, and water lubrication of wheel flanges on curves.

Management

On this broad subject the answered questions related to principally ejection of passengers, and the practice and esthetics of advertising. On the first topic the recommendation was that offending passengers be forcibly ejected only when necessary for the protection of other

passengers or the employee. There is no one best method of informing the public regarding changes in schedules, etc. Advertisements and reading notices in newspapers, "notice boxes" on cars, slips handed out by conductors, etc., are all effective. Esthetic objections to certain kinds of advertising on cars are often very practical ones. Advertisements will be tolerated by patrons only when cars are not "mussed up" and no inconvenience or danger to passengers is caused.

Unanswered questions on management referred to these subjects: Effects of advertising on railway traffic; free transportation for trainmen when not in uniform; information to be allowed to non-concerned employees in accident cases, and results of paid publicity campaigns in the public press.

Convention of Missouri Association

Boat Trip on Four Rivers Enjoyed—Jitney Discussed

A convention of the Missouri Association of Public Utilities was held on Board the steamer *Quincy*, May 27-30, during a trip from St. Louis down the Mississippi River, up the Ohio, the Cumberland and Tennessee Rivers and back to St. Louis. During the trip stops were made at Paducah, Ky., and Cairo, Ill. The technical sessions of the association were held during the trip.

In a paper on "The Modern Public Utility—Its Duty Toward the Public It Serves," H. B. Porter of St. Joseph, Mo., said that the whole idea of modern business is service. Money is not earned nowadays when it enters the cash register, but only after complete satisfactory service has been rendered to the purchasers. Employees must see to it that there is never the least suggestion of insincerity in the utilities' attitude towards the public.

J. H. Van Brunt of St. Joseph, in a paper on "Public Utility Commissions," said in part: "If the public utilities and the Public Utilities' Commission of Missouri shall so co-operate as to bring extended and better service to the public, greater security to investors in utilities' securities and greater prosperity to the utilities themselves, the dream of the author of the public utilities' commission's bill will doubtless have been realized."

The most important paper, from an electric railway standpoint, was by P. J. Kealy, member board of control Kansas City Electric Railways, Kansas City, Mo. The subject was the jitney. An abstract appears below.

The election of officers for the ensuing year resulted as follows: President, George E. Hayler, Jr., of Joplin; first vice-president, Hugo Wurdack of St. Louis; second vice-president, Bruce Cameron of St. Louis; third vice-president, J. H. Van Brunt of St. Joseph; secretary-treasurer, F. D. Beardslee of St. Louis.

THE JITNEY

In his paper on the jitney bus Mr. Kealy first traced the responsibility for its existence, which, he said, was due to the tremendous output of automobiles during the past three or four years, the rapid change in models, and, as a result, the market of second-hand automobiles being flooded. Then the industrial depression threw many men out of employment, and the jitney craze brought together these two unproductive elements, i.e., the unsalable car and the man without employment. Any wages which these men could earn so long as the car they ran was serviceable, represented food and clothing to them. A second reason for the jitney was the rapid increase in population of American cities which had made it practically impossible for the electric railways to provide adequate transportation in the evening rush-hours in most communities.

Mr. Kealy then analyzed the cost of operation of the jitney and determined that it was approximately 10 cents a mile for a small car and 15 cents a mile for a large car, and that this operating expense could not be met if passengers were carried beyond a 3-mile zone for 5 cents. The question, Mr. Kealy said, was not how objectionable the jitney is to the traction company, but whether it is an economic possibility and whether it can render better transportation to the community at the same cost as the street railway is now doing.

The author then pointed out that the practical limits of the jitney radius of operation to but 3 miles would justify legislation driving it out of existence because otherwise the property values given to real estate beyond the 3-mile zone by the traction company would be destroyed. The speaker also referred to the great expense which has been undertaken in large cities to reduce street congestion by relocating freight terminals, building elevated railways, etc., but if the jitney supplanted the street railway there would be ten times the congestion within the business districts as at present. This would be an intolerable condition. Finally, the speaker quoted some English figures to show that the motor buses abroad had many times the total accidents per vehicle as the tramways.

In conclusion he quoted a man as having succinctly said: "Every time you take a jitney you are wronging your neighbor who lives beyond the jitney limits, abandoning the congested tenements for the open air and garden opportunities for his family. You wrong the children who must ride to school from the outlying districts on the street car. You are not considering the justice in the matter when you take a jitney for a short one-way trip and take a street car beyond the jitney limit. You are not considering the wrong you are doing your friends who live beyond the jitney in making it necessary to limit his opportunity for frequent service by the street railway company. You forget the possibilities of the street car system being prevented from extending their lines. The patronage of the jitneys is unfair to the city, unfair to renters, unfair to suburban property owners and unfair to the traction company."

Interstate Monthly Report on Accidents

The Interstate Commerce Commission, Division of Statistics, has issued a tentative draft of its rules governing monthly reports of railway accidents to carriers and others interested for the purpose of receiving criticisms and suggestions. Criticisms were requested by June 1. The new draft differs from the one distributed under date of Jan. 9, 1915, in that the number of forms is considerably reduced, only one form being provided for the several different classes of train accidents and train-service accidents. The proposed requirement for individual reports of non-train accidents has been withdrawn and only a summary statement of non-train accidents is provided for in the report. The proposed summary statement of train accidents and train-service accidents has also been withdrawn. A requirement for reports of rail failures resulting in train accidents has been added. The definition of reportable injuries to employees has been modified so as to make the minimum limit three days' incapacitation in the ten days following the accident, as is now in force. Numerous other, but minor, changes have been made which appear upon a reading of the draft.

In making the revision the commission says that it has had the benefit of the suggestions of the committee of the American Railway Association, composed of Julius Kruttschnitt, chairman; W. W. Atterbury and W. G. Besler.

The Chicago, Milwaukee & St. Paul Locomotives

Among the Interesting Features of These New Electric Locomotives Are Large Motor Capacity with Axle Mounted Motors, Regeneration on Down Grades and a Novel Method of Current Collection

BY A. H. ARMSTRONG, ASSISTANT ENGINEER, RAILWAY AND TRACTION DEPARTMENT, GENERAL ELECTRIC COMPANY

The flexibility in design and operation of the electric locomotive afforded by the use of electric motors renders this type of motive power especially well suited to the hauling of trains, either high-speed passenger or slow-speed freight. In fact, the electric locomotive possesses inherent qualifications for haulage service that are becoming more fully appreciated as constituting the fundamental reasons for bringing about the change from steam to electricity, and interest in any new projected electrification therefore largely centers in the characteristics of the locomotives proposed. Work has progressed upon the Chicago, Milwaukee & St. Paul locomotives at the Schenectady and Erie works of the General Electric Company to such an extent as to make available certain facts as to construction and capacity that are of especial interest owing to the magnitude of the problems involved in this extensive electrification.

C., M. & ST. P. LOCOMOTIVE—VIEW OF COMPLETE UNIT OF WHICH TWENTY-ONE ARE NOW UNDER CONSTRUCTION. EACH LOCOMOTIVE HAS EIGHT MOTORS, TOTALING 3440 HP.

The general data applying to the St. Paul freight locomotives are given in Table I on the next page.

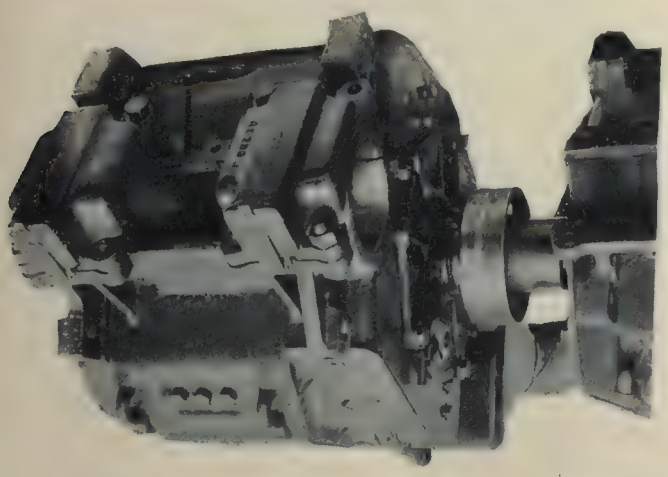
A very exhaustive series of tests has just been completed upon the first sample motor built at Schenectady, and has demonstrated that it has ample capacity to meet the heavy demands that will be placed upon it under service-operating conditions. The motors are wound for 1500 volts and connected two in series for 3000 volts. The power axles are driven by twin gears, in this respect being similar to the drive on the Great Northern, Detroit Tunnel, B. & O. and Butte, Anaconda & Pacific, except that springs are used in the axle gears. On account of the high voltage for which the motors are wound, the commutator width is small, thus allowing more space for armature iron and copper, with the result that the motor has a continuous capacity of 375 hp. In fact, special interest attaches to the large continuous capacity of the St. Paul locomotive as this is the first instance where such a liberal motor capacity has been required and provided for, and it should be noted that this large capacity is secured in an axle motor without departing from well known and thoroughly tried out forms of construction.

A study of the train dispatcher's sheet covering performance on mountain grade divisions of our steam railways shows that it is general practice to assign such a trailing tonnage to a locomotive on ruling grade

as to demand a tractive effort at the driver rims equivalent to approximately 18 per cent to 19 per cent of the weight upon the drivers. In other words, steam practice calls for a locomotive which can operate for long periods at a coefficient of adhesion of from 18 per cent to 19 per cent, leaving the difference between this value and the slipping point of the drivers, as a sufficient margin with which to start on ruling gradients. Under like track conditions, the uniform torque of the electric motor should make available some 10 per cent more tractive effort than is possible with the reciprocating drive of the steam locomotive having the same weight upon the drivers. Until sufficient operating experience is available, however, to prove that an electric locomotive can be rated at 20 per cent coefficient of adhesion, it seems reasonable to adhere to the present steam practice of a somewhat lower value. The St. Paul locomotive, therefore, with its continuous motor capacity of 17.75 per cent and a one hour rating of 21.2 per cent of weight on drivers gives ample assurance of ability to handle its assigned tonnage under all service conditions.

TABLE I—GENERAL DATA ON CHICAGO, MILWAUKEE & ST. PAUL FREIGHT LOCOMOTIVES

Type of locomotive	3000 volts direct current
Length over all	112 ft.
Total wheel base	103 ft.
Rigid wheel base	10 ft. 6 in.
Total weight	520,000 lb.
Weight on drivers	400,000 lb.
Weight on driving axle	50,000 lb.
Weight on guiding axle	30,000 lb.
Diameter of driving wheel	52 in.
Diameter of guiding wheel	36 in.
Number of driving motors	8
Total output (continuous rating)	3000 hp.
Total output (one hour rating)	3430 hp.
Tractive effort (continuous rating)	71,000 lb.
Per cent of this T. E. to weight on drivers	17.75
Speed at this T. E. at 3000 volts	15.75 m.p.h.
Tractive effort (one hour rating)	85,000 lb.
Per cent of this T. E. to weight upon drivers	21.2
Speed at this T. E. at 3000 volts	15.25 m.p.h.

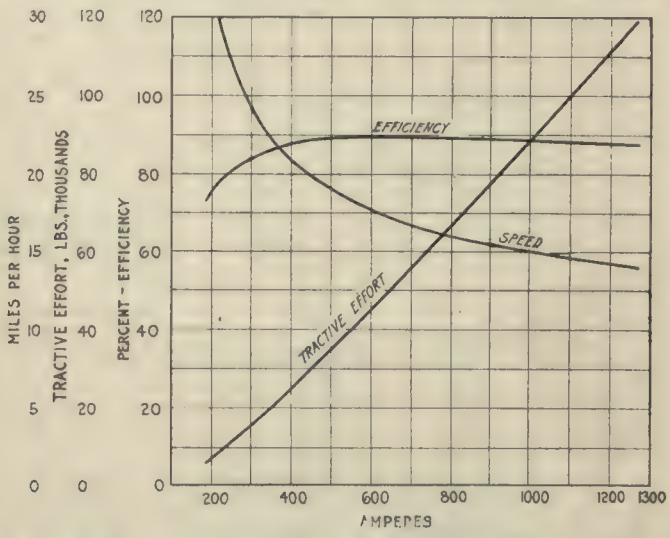


C., M. & ST. P. LOCOMOTIVE—END VIEW OF MOTOR ARRANGED FOR STAND TEST

The St. Paul freight locomotive is guaranteed to have a hauling capacity of 2500 tons trailing load on all gradients up to 1 per cent, and its heaviest duty will be to haul this load from Lombard to Summit over the Belt Mountains, a distance of 49 miles with a ruling grade of 1 per cent and an average grade of 0.7 per cent over the entire distance. Including the locomotive of 260 tons, the gross train weight of 2760 tons will require a tractive effort of approximately 72,000 lb. on the 1 per cent ruling grade, based upon a train resistance of 6 lb. per ton. This practically corresponds to the continuous rating of the locomotive, as tabulated above, and brings out the interesting fact that these locomotives are so proportioned as to motor capacity that they cannot be abused under normal service operation.

The necessity of rating main line electric locomotives upon a practically continuous basis is still further emphasized in the case of the St. Paul locomotives by the introduction of electric regenerative braking. The heavy demands upon the motors when operating upgrade may be nearly duplicated during the following down-grade running when regenerating, thus giving small chance for the time element of the motor heating to enter as a factor in proportioning its capacity for such exacting service. A 2 per cent grade requires a motor output of 46 lb. per ton up grade and gives 34 lb. per ton motor input down grade. Making due allowance for internal locomotive losses, it is evident that the motor output when operating as a generator down grade will approximate 60 per cent of its input when hauling the same train up a 2 per cent gradient. Hence the need of making provision for a practically continuous motor capacity in the St. Paul locomotives in order to meet the service requirements of the broken profile over which they are designed to operate.

It is interesting to compare the relative capacity of the new electric locomotives and the Mallet engines they will replace. This is shown in Table II:



C., M. & ST. P. LOCOMOTIVE—CHARACTERISTIC CURVES OF 3000-VOLT D.C.-FREIGHT LOCOMOTIVE

TABLE II—COMPARISON MALLET AND ELECTRIC LOCOMOTIVES

	Mallet	Electric
Total weight	555,700 lb.	520,000 lb.
Weight on drivers	324,500 lb.	400,000 lb.
Rated tractive effort	76,200 lb.	85,000 lb.
Per cent of weight on drivers	23.5%	21.2%
Rated tonnage 1% grade	1,800 tons	2,500 tons
Tractive effort for above tonnage	54,000 lb.	71,700 lb.
Coefficient of adhesion	16.7%	17.9%
Wheels per guiding truck	2	4
Weight per driving axle	54,000 lb.	50,000 lb.
Total weight on one rigid wheel base truck	162,000 lb.	100,000 lb.

Under favorable conditions the Mallet engine can haul 2000 tons on 1 per cent grade, thus bringing its tractive effort up to 59,000 lb. and the coefficient of adhesion on its drivers up to 18.3 per cent. The electric locomotive weighs 94 per cent of the combined weight of Mallet engine and tender and has a tonnage rating of 23½ per cent greater, based upon using the same coefficient of adhesion in each case, that is, 17.9 per cent. This comparison indicates that the electric locomotive has a hauling capacity one-third greater than the steam engine and tender of the same total weight, has less weight per axle, is provided with four-wheel guiding truck in place of two-wheel, requires no turntable as it operates equally well in either direction, and, finally, eliminates the necessity for stopping to take on coal and water.

The same type of locomotive is used for both freight

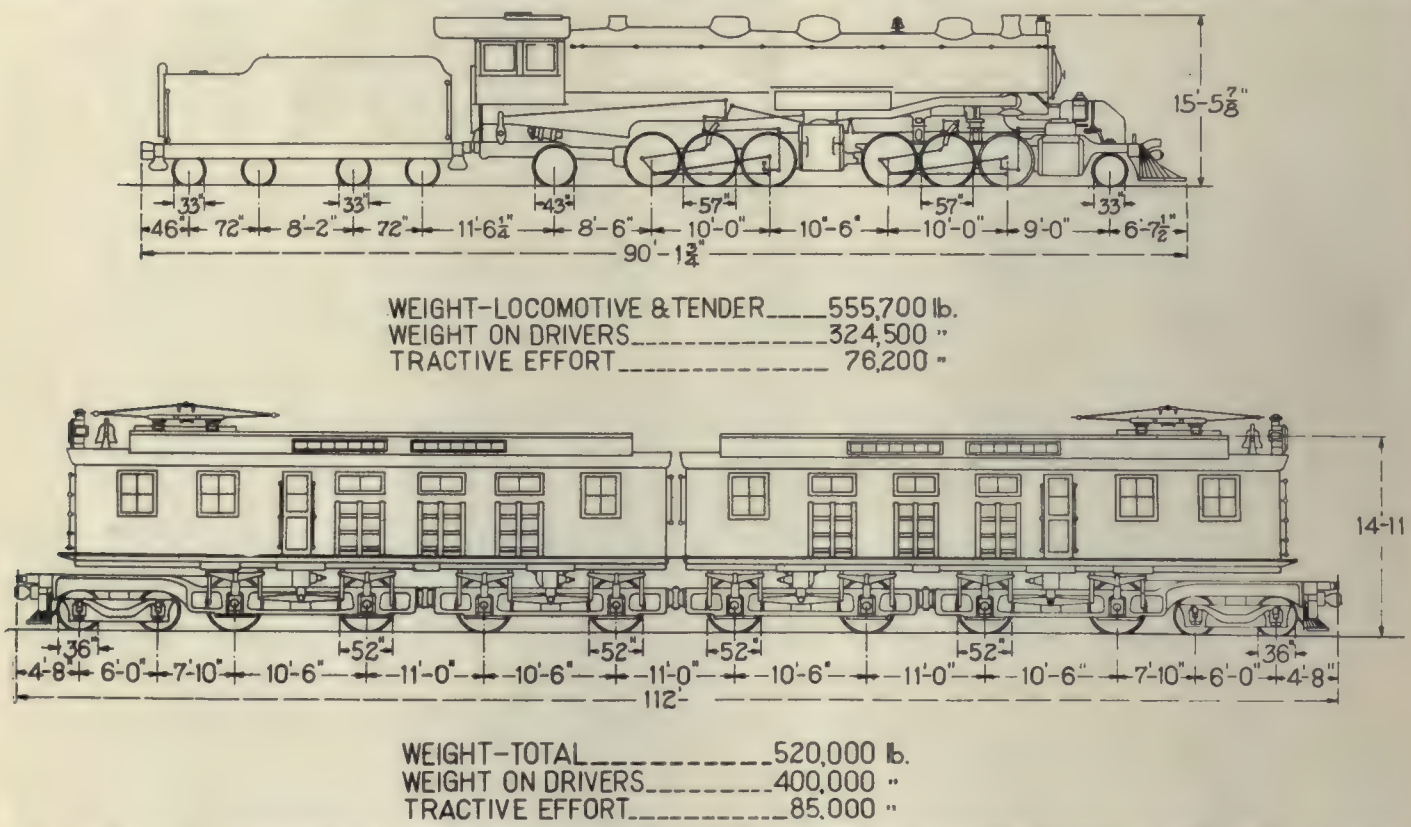
and passenger service, the only difference between the two being the gear ratio which is 4.56 for freight and 2.45 for passenger service. This interchangeability of all parts of the freight and passenger locomotive and the adoption of one uniform type for all classes of service should be reflected later in the low cost of maintenance of the locomotive as well as prove of great benefit in the economical handling of the traffic. For facility in shop repairs, the locomotive is constructed in halves, and in fact each half can be provided with draft gear in place of the articulated joint and operate singly in service up to its capacity. One passenger locomotive will haul a trailing load of 800 tons over all gradients of the road without assistance except upon the 2 per cent grade section over the main divide of the Rocky Mountains. Even on this grade a 600-ton train can be handled without assistance. This illustrates the exacting nature of mountain railroading which demands in this instance that the passenger locomotive shall have the necessary motor capacity and smooth running qualities to successfully haul an 800-ton train at 60 m.p.h. on level track and also operate over 20 miles of 2 per cent up grade. Add to this the regenerative braking feature and steam heaters for train heating, and the broad nature of the problem of designing an electric locomotive for main line mountain service becomes very apparent. The locomotive superstructure contains space for two oil-fired steam heaters, together with ample provision for storage of oil and water. All passenger locomotives and a certain number of freight locomotives intended as reserve passenger units will be equipped with heater boilers.

Current Collector and Other Details

A departure from the roller current collector of the Butte locomotive has been made in the St. Paul locomotives as the result of numerous experiments made upon the test tracks at Schenectady and Erie. These tests indicate that a double pan collector bearing against twin conductor trolley wires is capable of taking off a current of 2000 amp. at speeds as high as 60 m.p.h. This is several times the demand upon one collector of the St. Paul locomotives, and the double pan was adopted in place of the roller collector, although the latter has been giving excellent results, reaching a life of nearly 30,000 miles in the passenger service of the Butte, Anaconda & Pacific Railway.

Provision has been made in the control to enable two locomotives to be run together in multiple unit, but the enormous starting effort of two such locomotives, 240,000 lb. tractive effort at 30 per cent coefficient of adhesion, makes such a combination of use only when it acts as a pusher on the rear of a train. The motors and starting resistances are designed to permit of a starting effort of 120,000 lb., being maintained on one locomotive for a period of five minutes without destructive heating, and in this connection the thermal capacity of the heavy slow-speed motors will be of great assistance.

The first completed St. Paul locomotive will probably be placed upon the test tracks at Erie during September and shipment of these locomotives commenced soon thereafter. The construction work upon trolley and substations of the first engine division between Three Forks and Deer Lodge has been so far completed as to give promise of being finished and ready for the trial runs of the locomotives as soon as they are received this fall. Ample provision has been made for power and transmission line facilities by the Montana Power Company, so that electrical operation of the Chicago, Milwaukee & St. Paul Railway should soon be an accomplished fact.



C., M. & ST. P. LOCOMOTIVE—DIAGRAM GIVING COMPARATIVE DATA OF COMPLETE ELECTRIC UNIT AND MALLET COMPOUND STEAM LOCOMOTIVE

A reduction of 511 in the number of accidents reported for February of this year as compared with the same month the year before is a record of the Detroit United Railway. There were 1655 accidents in February, 1914, and 1144 in February, 1915.

ANNUAL CONVENTION SAN FRANCISCO OCTOBER 4 TO 8, 1915

American Association News

ANNUAL CONVENTION SAN FRANCISCO OCTOBER 4 TO 8, 1915

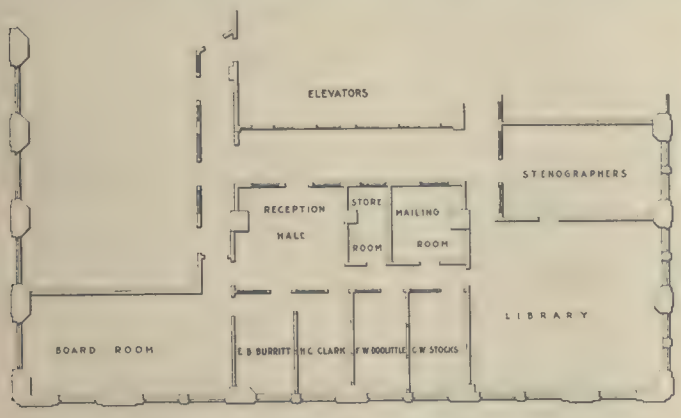
Association Headquarters Moved this Week to No. 8 West Fortieth Street—A Plan of the Offices is Given Below —Chicago Elevated Section Holds Its Second Meeting and Plans to Select Delegates to the Convention

THE NEW ASSOCIATION HEADQUARTERS

As was announced last week on this page the offices of the association in New York have been moved to No. 8 West Fortieth Street. A view of the building, a structure just completed, is given herewith. As the illustration shows, the new building is but a few doors from the Engineers' Club, which appears at the right.

VIEW ON WEST FORTIETH STREET, NEW YORK CITY, SHOWING NO. 8 AT LEFT AND ENGINEERS' CLUB AT RIGHT

The building is just west of Fifth Avenue, from which buildings are numbered east and west in New York City, and opposite one end of the New York Public Library, which extends from Fortieth to Forty-second Street on Fifth Avenue. The general layout of the



PLAN OF NEW ASSOCIATION OFFICES AT NO. 8 WEST FORTIETH STREET, NEW YORK CITY

association offices on the seventh floor is shown in the diagram printed above. In this layout the best possible use of the available space is made, and Mr. Burritt and his colleagues are grouped for convenience of communication.

The moving was accomplished without interference with the work and so expeditiously that when the rules committee arrived on June 3 for the meeting announced below, the board room and offices had quite a "settled" appearance.

The association rooms stretch along the west side of the building, facing toward the Engineers' Club, while the end window in the board room overlooks the New York Public Library, of which a corner is seen at the left-hand edge of the photograph.

CHICAGO ELEVATED RAILROAD SECTION

The meeting of company section No. 6 was held on May 25 with 115 members in attendance. Secretary Dwight L. Smith announced that seventeen applications for membership had been received and passed by the executive council, and nine other applications are awaiting acceptance. This will bring the total membership up to 162.

Two interesting papers illustrated with lantern slides were presented at this meeting; one a description of a new double-deck bridge over the Chicago River, by C. M. Mock, chief engineer, and the other a description of the new steel cars recently purchased by the company, by H. A. Johnson, master mechanic. Both of these papers treated the subjects in an educational way, discussing them particularly from an engineering standpoint. For instance, the description of the bridge not only took up the engineering difficulties, but described how the construction would proceed and how it would affect operation. The steel-car paper discussed the engineering considerations entering the design, and compared the new cars with the wooden ones now in service.

Announcement was also made at this meeting of the plans for selecting the two delegates who are to be sent by President B. I. Budd to the San Francisco convention of the association. One representative will be the member of the section who submits the best suggestion tending to further the company's interests, along such lines as improving the service, increasing safety, reducing expenses, stimulating traffic, improving equipment, or outlining more efficient methods to be employed in the maintenance of equipment. The other representative will be elected by popular vote, after a primary election for the choice of five candidates.

COMMITTEE ON RULES

The final meeting of the T. & T. Association committee on rules met in New York at No. 8 West 40th Street, on June 3, with the following in attendance: W. H. Collins, Gloversville, N. Y., chairman; L. H. Palmer, New York, vice-chairman, and C. E. Morgan, Jackson, Mich. No new topics were considered, but the conclusions reached at earlier meetings were put into form for the annual report and in this form will be submitted to the entire committee at once. Recent important meetings of this committee were reported in the ELECTRIC RAILWAY JOURNAL as follows: Feb. 20, page 379; March 20, page 589 (joint meeting with block signal committee); April 10, page 713 (meeting of joint subcommittee appointed March 17).

COMING COMMITTEE MEETING

The committee on way matters of the Engineering Association will meet in Chicago on June 11 and 12.

COMMUNICATIONS

Mr. Sprague on Regenerative Braking

NEW YORK, May 19, 1915.

To the Editors:

I note that the ELECTRIC RAILWAY JOURNAL has been giving considerable editorial attention of late to the subject of regeneration of electrical energy in heavy electric traction. As I have been engaged in pioneer work along regeneration lines for many years you may be interested in a few historical notes regarding this work. It has been based upon the principles which first found their development and practical application in my constant-speed electric motors developed for stationary work some thirty years ago in the early days of this art. At that time I pointed out that in order to get constant speed under variable load, with a shunt motor supplied from a constant-potential circuit, it was necessary automatically to vary the field magnet strength inversely with the load, and therefore the motor or counter emfs, so as to vary the effective or differential emfs and currents directly with the load.

The principle underlying this regulation, applied to motors with shunt fields alternately driving a load or being driven by one, of course indicated that when so driven by a load the raising of the motor emf above that of the source of supply would produce a reversal of current and consequent delivery of energy to the line.

The first practical commercial application of this principle that I know of was in my use of shunt-wound motors to drive line shafts from which balanced freight elevators were operated by direct and reverse belts. In such cases when a load was being lowered it drove the motor at a slightly accelerated speed and delivered current to the line, thus making it possible to operate a very large number of elevators from a common source of supply with a minimum total expenditure of current.

I early developed this principle in its application to railway work, and in December, 1885, before the Society of Arts in Boston, outlined at length a method of electrifying and operating the Manhattan Elevated Railroad, so that by using shunt motors and the principle of shunt-field regulation it would be possible to save fully 60 per cent in the size of the central station and in the amount of power required, because every car or train running on a down grade, or approaching a station at a speed above a certain value, would constitute a moving supply station to supplement the main power station in providing current for cars accelerating, ascending a grade, or operating at constant speed.

Such operation was demonstrated for a considerable period on a platform car at the old Durant Sugar Refinery on East Twenty-seventh Street, New York, in 1886, and for some months on the Thirty-fourth Street branch of the Elevated Railroad in the winter of 1886-1887. At this time I used shunt field variation, not only for speed control but also for first delivering current back to the line in slowing down the speed of a car, and then, breaking away from the line, for bringing the car to rest by sending the current generated in the armature through a diminishing resistance until finally it became practically a short circuit, the field still being connected to the line. In the public tests in this connection the car was often handled entirely without the ordinary wheel brakes.

The method of operating trains with shunt-wound, constant-potential motors had two difficulties, one being a lack of starting torque as compared with a series-wound motor, and the other that success in using this method of regeneration required motors of similar characteristics and wheels of like diameters, or methods of adjustment to take care of any differences which might exist. With these factors equalized there was no question of the remarkable efficiency of control and saving of energy.

In 1886 I extended my patents to cover the application of the same principle to the recharging of storage batteries when used upon a street car. I think that I am correct in stating that these various patents and the principles outlined in them marked the first recognition of the possibility of the use of a regenerative principle in a practical way.

Since that time a great many uses have been made of this scheme. One very common one was that developed by me about 1890 in connection with elevators operated against gravity. In my earlier multiple-sheave screw machines the load was always against the machine, that is, even with no load in the car the weight was unbalanced by, say, 600 lb. or 700 lb., enough to rapidly overhaul the machine. The motors, therefore, on the up-trip always worked against a load, but on the down trip the armature was detached from the source of supply, closed upon an adjustable rheostat, and the speed of the car was governed by the retardation so established. The safety device at the bottom operating on failure of current also made use of this principle.

On the Central London elevators, which represented by far the largest elevator equipment ever put in at the time of its installation in 1897-1898, the operation was on similar principles, except that in this case the elevators were practically counter-balanced, so that the motors were sometimes driving and were sometimes driven in each direction of movement. This resulted in material economy.

Various attempts have been made in recent years to apply this principle to series-wound motors in operating street cars, and a number of tests were made in England in this connection. In the application of polyphase motors to railway service the principle of regeneration to line was, of course, the natural application of their shunt-wound motor characteristics. Following this application in Italy various plans have been advanced for using the regenerative principle in connection with single-phase motors, although the problem in this case is not by any means so simple, especially if it be desired to use all the motors of an equipment. Incidentally, I had, on the first modern electric railway installed in Italy by my assistant in 1890, used this same principle as a special safeguard made necessary by a grave accident occurring shortly after the opening of the road. After this accident it seemed important to put into the hands of the conductor the ability to take the control of the car acceleration out of the motorman's hands, and to make the car act as its own braking power.

Later, I proposed for d.c. motors on mountain duty the use of the regenerative principle, primarily for braking or checking the train on a down grade, using all the motors, not for sending current back to the line but for generating current under controlled resistances upon the locomotive, the motors being self excited with reversed armature connections. This was not done for purposes of power economy but primarily to avoid the disastrous consequences of over-heated brakeshoes and wheel rims after long brake applications, and the failure of air supply when perhaps unduly overtaxed. In this case the braking could be alternated or divided between motors and air brakes.

I proposed this plan practically for a suggested electrification of the Sacramento division of the Southern Pacific Railroad over the Sierra Nevada mountains in

1907, 1908 and 1909. A variation of this use of motors as self-exciting generators on a locally closed circuit is to use a line-excited motor-generator to excite the series field coils of the motors, leaving the armatures connected with the line so as to be able to receive current from, or send back current to it, with provision for changing the connections so as to get local self-excitation for rheostatic braking in case of necessity.

This later plan, like many others which I have found necessary to carry through in the face of doubt and criticism, did not meet early acceptance, but it is probably the method which must be adopted at least with direct current motors. FRANK J. SPRAGUE.

Investment Per Passenger

SLOAN, HUDDLE, FEUSTEL & FREEMAN
CONSULTING ENGINEERS

MADISON, WIS., June 2, 1915.

To the Editors:

I have noticed the article by D. J. McGrath in the ELECTRIC RAILWAY JOURNAL of May 8, and was much interested in finding that a study was being made to show more clearly to the public just what application was made of the fare received by street railway companies from its patrons. The studies described by Mr. McGrath represent, to my mind, the first step in presenting this matter properly to the public.

In my work with a considerable number of public service commissions throughout the country who are regulating rates for utility commodities, it has usually developed that when the consumer came to a clear understanding of the basis for the charge which was being made upon him, he was willing to pay fairly for the cost of the service which was being furnished.

Unfortunately, due to the operation of certain misguided public utility men, who were really financiers and not operators, the problem of convincing the public that utilities of various kinds are not a veritable gold mine has been a difficult one. The wide variation in the laws governing the issuance of utility securities has helped to increase the doubt in the public mind. Published extracts from annual reports of utility companies indicating satisfactory dividends, some times issued for financial purposes, have also added fuel to the fire of mistrust. As pointed out in Mr. McGrath's paper, the past practice of indicating the investment per mile of track or per dollar of gross revenue has been unsatisfactory not only to the public but to the trained operator. The varied conditions which obtain in small and large city construction, where street improvements and varying length of haul play such an important part, make these figures of little value. We must, therefore, find some method of presenting these facts in terms simple enough to be readily understood by the average patron.

I believe that further development should be made along the lines suggested in the article and units should be prepared which will further divide the average fare so that the patron can see at a glance its various applications. For example, in the case of the Manchester Street Railway Company, of Manchester, N. H., which was cited by Mr. McGrath, the investment per passenger would be somewhat misleading, as he points out, due to the fact that this company is purchasing power and does not have any investment in a power station. We would, accordingly, expect to find its operating expenses for power charges greater than that of a company furnishing its own power.

I believe, therefore, that it is necessary to take additional steps to show the application of the total amount of the average fare received per passenger to all the fixed and variable expenses which enter into the cost of furnishing street railway service. If this were done, in many cases patrons of the city lines would be very much surprised to find out the portion of the average 5-cent fare which goes toward paying a fair return on the investment, and that which goes for operating expenses and depreciation.

ROBERT M. FEUSTEL.

Traffic Characteristics

AMERICAN ELECTRIC RAILWAY ASSOCIATION
BUREAU OF FARE RESEARCH

NEW YORK, June 2, 1915.

To the Editors:

In the article on "Traffic Characteristics," appearing in the issue of the ELECTRIC RAILWAY JOURNAL of May 15, the descriptive titles of Fig. 3 and 4 (pages 927 and 928), have been transposed. Probably no confusion resulted from this, as the units of each scale are shown in the figures, but I am taking the liberty of calling the matter to your attention in this manner, in order to remove any possibility of confusion.

The method of construction of these models may be of interest.

On a sheet of cross section paper there was first laid off a horizontal line representing to scale the distance between points where traffic observations were made on a typical line.

Ordinates were next erected at each point of observation, representing to scale "total passengers" or "passengers per car" observed at that point. The plotted ordinates represent "hourly rates"; that is to say, where the total number of passengers passing a point of observation was, say 200 from 3:30 to 4:00 p. m. and 300 from 4:00 to 4:30 p. m. The ordinate erected at that point of observation would be drawn to represent 500 passengers per hour.

The next step was to connect the ends of the ordinates by a curve. The cross section paper was then pasted to a sheet of cardboard and cut along the base line and the curve connecting the tops of the ordinates. This process was repeated for each of the twenty-four hour-periods of a typical day. Values used in this work were averages determined from observations extending over a period of three days.

The twenty-four cardboard curves were next arranged in order, in notches sawed in the board which forms the basis of the model. The position of these cardboard strips is shown by the dark lines transversing the figures. Between the strips a plastic material was placed, and each of the twenty-four prisms was smoothed off to conform with the trend indicated by the adjoining prisms. The resulting surface was finally painted and varnished.

F. W. DOOLITTLE, Director.

The Nashville Railway & Light Company, Nashville, Tenn., profiting by the experience of the Knoxville Railway & Light Company, Knoxville, Tenn., is enlisting the interest of the pupils in the public schools in the safety-first work it is doing. Blotters on which there are pictures of typical accidents that are the penalties of carelessness and "hooking rides" have been distributed among the children of the schools and the teachers are having the pupils write short articles on the impressions gained from the pictures. The Knoxville Railway & Light Company provided a schedule of prizes, in the form of free-ride books, each containing tickets for fifty rides. The local company may follow the same course next season, but as the school term will soon be over no action of the kind will be taken this summer.

Equipment and Its Maintenance

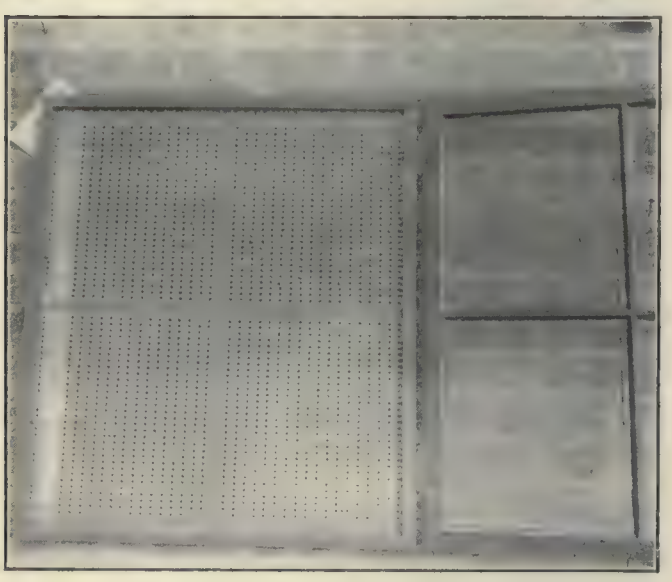
Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

(Contributions from the Men in the Field Are Solicited and Will be Paid for at Special Rates.)

The Tri-City Railway Trouble Board

BY JOHN SUTHERLAND, MASTER MECHANIC TRI-CITY RAILWAY & LIGHT COMPANY, DAVENPORT, IA.

The trouble board has become an indispensable part of the shop records of the Tri-City Railway & Light Company, Davenport, Ia. This board is made as simple as possible, and, for the sake of accuracy, the record is kept covered with a locked glass door and no extra pegs are supplied. The essential features of this board are shown in the accompanying illustration. The records for two groups of cars appear on the board as pegs inserted in the proper vertical column to designate the date and on the same line as the car number. The upper group includes pay-as-you-enter cars and other cars in regular service, and the lower group all extra and open cars. The car numbers are recorded with chalk so that their position may be changed to show their track location. The unmarked column at the extreme left of the board is used only for extra pegs. Two columns at the extreme right of the board



TRI-CITY RAILWAY TROUBLE BOARD

are for dead cars, those out of service on account of wrecks and those being overhauled or painted. A black peg in one of these columns indicates that the car has been in a wreck, and a white peg that the car is being overhauled or painted. In the dated columns, black pegs indicate when the car was last inspected and white pegs when the car was last oiled. The oiling pegs are inserted by the oiler and inspection pegs by the shop foreman, and, in addition to the trouble board, a book record is kept.

During the winter months only white pegs appear in the lower group, since the cars in this group are used only during the summer months. All cars are oiled and inspected every fifteen days, the time being changed occasionally according to the condition of the car. A rule has been made that an interval of at least two days shall elapse between an oiling and an inspection unless the car is in bad order, which is indicated by a black and a white peg inserted in adjacent holes. The track location of the car is shown by the line on which the number is written on the board. All car-storage spaces in the shops receive consecutive numbers which correspond to the line on which the car numbers are written.

Mysterious Derailments

BY R. P. WILLIAMS, INSPECTOR OF SPECIAL WORK BROOKLYN RAPID TRANSIT SYSTEM

Determining the cause of derailments is often a difficult matter, and investigation may show many conditions of a contributory nature. Each may be removed as found and yet the real reason still remain a mystery.

A notable case of this kind occurred on one of our lines some time ago, with the introduction of a new type of truck. The cars were operated successfully over the various switches about the carhouse, there being right and left-hand switches of 50-ft., 75-ft. and 100-ft. radii. But one particular switch on the main line of 150-ft. radius, at a short line terminus, could not be negotiated without considerable trouble. In many cases the air brake had to be abandoned, the hand brake used, and the process of jumping or jerking the truck in short movements resorted to. Examination of the switch and mate showed gage and surface to be good. Travel on the main line, the straight track, being much greater than on the curve, left the mate floor high. The tangent guards, also, having a 1¼-in. groove, showed ¾ in. above the level of the head.

The tongue of the switch was of manganese steel, and straight track wear gave the top guard edge a degree of sharpness that might tend to lift a wheel. The distance between the inner edges of guards was found to be nearly the limit in width. None of these defects was so pronounced as to be considered dangerous, and as no other type of truck gave trouble, it was decided to investigate truck condition. This showed various minor conditions tending toward derailment, but not sufficient to cause it.

Beginning with the switch, every known tendency to derailment was removed by grinding until the switch was in perfect condition, but derailments still continued. The truck then received its share of attention, the builders of the truck taking a lively interest.

In one of these trials, after some new adjustment of the truck, conditions showing very little improvement, our engineer of surface lines suggested that possibly the trouble might be caused by the condition of the tangent track just ahead of the switch, the mate-side rail being low. But, inasmuch as all cars were brought to a full stop before entering the switch, the switch mate and guard rails themselves being level, this low spot, it was thought, could not have much bearing on the case. After some further adjustment of the truck without improving conditions, examination of the low spot referred to showed that it corresponded to the length of truck base. The track was leveled and derailments ceased entirely.

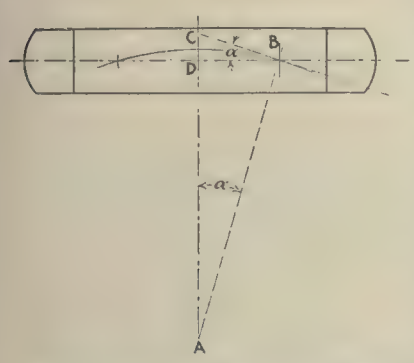
It was reasoned that, on account of this low spot, the

weight of the car was thrown on opposite side bearings, the truck entering the switch having most of its weight thrown to the mate-side wheels, correspondingly lightening the tongue-switch side and accentuating all of the defects in the truck and track.

It would be of interest to know if the leveling of the track in the first place would have been sufficient to have prevented the derailments.

Truck Angularity on Curves

A correspondent in Kansas City, Mo., calls attention to a useful short-cut method for finding the angle which a truck makes with the car body when the car is on a curve. He states that he has found the practice in many drafting rooms to be to lay out on a curve all of the lines shown in the accompanying diagram in order to find the angle *CBD*. Here *AB* is the radius of curvature and *DB* is one-half the distance between truck centers. From the diagram it is evident that triangle *CBD* is similar to triangle *BAD* and, therefore, that angle *CBD* equals angle *CAB*. These angles have been designated by α. Now if any triangle similar to *CBD* be constructed such that the short side is proportional to one-half the distance between truck centers and the hypothenuse is, to the same scale, proportional to the radius of curvature, the desired angle can be found at once. The only drawing necessary is this one right triangle.



TRUCK ANGULARITY ON CURVES

If a table of sines is at hand the angle can be calculated without making any diagrams by noting that

$$\text{sine } \alpha = \frac{DB}{BA}$$

That is, the angle which a truck center line makes with a car-body center line is that whose sine is one-half the distance between truck centers divided by the radius of curvature.

Paving Experiences at Joliet

BY JOHN B. TINNON, ENGINEER MAINTENANCE OF WAY CHICAGO & JOLIET ELECTRIC RAILWAY

The standard rail of the Chicago & Joliet Electric Railway for work in streets with brick pavement is 100-lb., A. R. A. "A" Illinois Steel Company section No. 10,020, although we still have a great deal of pavement with Lorain Steel Company section Nos. 60-263 and 80-335.

We have a single track on a 42-ft. street, the main business artery of Joliet, that was built and paved in the year 1906. This construction consists of Lorain No. 80-335 rail in connection with wooden ties, a concrete paving foundation of 1-3-6 mixture from the bottom of the ties up to 5½ in. below the top of the rail, a 1½-in. sand cushion and a brick paving with grout filler. Nelsonville filler and stretcher brick were used on this work, and the pavement is still in very good condition, although a count made last autumn showed that the vehicular traffic on this section is about 2000 vehicles in ten hours. If it had not been necessary on several occasions to disturb this pavement in order to repair and finally to remove all thermit joints and to put in 10-ft. sections of new rails where the joints were cut out, the paving would have been in almost as good condition as when it was laid. In some cases the stretcher bricks are beginning to show considerable wear.

We have no 100-lb. rail that has been in use longer than 2½ years. As the paving with this rail has not commenced to show any wear at all, we cannot give any data on it; nor is any wear shown on light travel streets with overhauled 60-lb. rail where this style of pavement has been used for the last four or five years.

This company has always used brick pavement in paved streets except that some asphalt was used about fifteen years ago. Originally, and until about 1905, we used a common small paving brick for stretcher, and building brick for filler. The foundation was of concrete made from natural cement, usually placed by a contractor and not very stable. The bricks were laid on a sand cushion and filled with sand. During the coming summer we expect to remove the last of this type of pavement because the rail, which is of Lorain 60-263 section, is too light for the cars. Although this pavement is in bad condition it would last for two or three years and possibly for five years more if some general repairs were undertaken. However, as the city expects to repave the streets affected, new paving is a necessity. The street in question is one of the heavily-traveled thoroughfares of Joliet and the amount of its traffic is about 1500 vehicles in ten hours.

Commutator Soldering Torch

BY J. C. DONOVAN, MASTER MECHANIC UNION ELECTRIC COMPANY, DUBUQUE, IOWA

To preheat the commutator leads of armatures so that solder will flow in freely, a solder-melting torch has been provided in the armature repair department of the Union Electric Company, Dubuque, Ia. A view of this torch is shown in the accompanying illustration. The burner and mixer, which are of a standard type, are fitted with two hose connections, one to the shop compressed-air supply and the other to the shop gas supply. The flow of gas and air to the mixer is regulated by brass shut-off cocks at the point where the hose connects to the torch. Valves at the point where the hose connects to the shop gas and air systems, however, are used to admit air and gas to the burner. The burner is pivoted horizontally and may be fixed in any position by a set screw, and an extension feature in the standard permits vertical adjustment. This is obtained by connecting the burner on a rod which fits the ¾-in. pipe standard snugly, and the set screw at the top of this pipe fastens the burner in any position. The base of the standard was made of a defective gong filled with refuse babbitt. The outfit complete with hose, brass shut-off cocks and labor cost approximately $5.

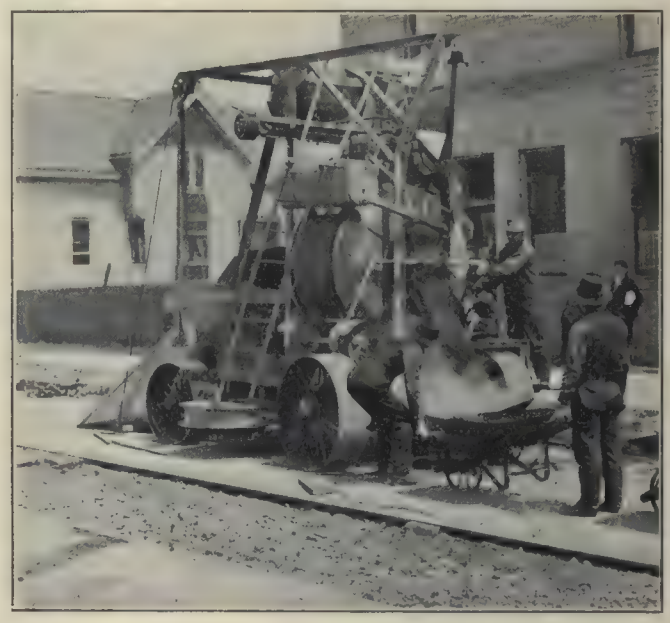
DUBUQUE RAILWAY—COMMUTATOR SOLDERING TORCH

Economical Asphalt Relaying with Hot Mixer

The way and structures department of the Milwaukee Electric Railway & Light Company is obtaining successful results in patching and relaying asphalt street pavement by the use of a portable concrete mixer and a heating plant built in one unit. While this is used primarily for bituminous mixing, it is readily convertible for concrete mixing as well.

The Milwaukee company has a large mileage of asphalt pavement which requires the usual amount of resurfacing and patching, and all of this work formerly was done by contract. The company has a large stationary asphalt plant, but for relaying and patching jobs generally distributed in all parts of the city this small portable-unit has demonstrated superior economy. The hot mixer, which is shown in the accompanying engravings, was purchased from the Koehring Machine Company of Milwaukee and has recently been used with success on three jobs totaling about 3 miles of double track.

MILWAUKEE PAVING—LOADING OLD ASPHALT INTO HOT MIXER



MILWAUKEE PAVING—DISCHARGING HOT REMIXED ASPHALT

The machine is a combination heating plant and mixer designed for bituminous concrete road mixtures and for sheet asphalt, rock asphalt and cement concrete work. The capacity is a 22-cu.-ft. batch. The general design is such that the machine will pass under all overhead structures, and it is of narrow construction so that it may stand beside the curb and yet leave space for cars to pass on the near track while men are working between the track and the mixer. The machine is not special, except that for general use such plants are driven by gasoline or steam engines while this plant is driven by a 15-hp., 550-volt, 550-r.p.m. G. E. motor fed from the trolley. This motor serves to operate the entire mixer, with its mechanical charger and hot-blast apparatus, and also, through a set of transmission gears, it serves to propel the mixer at either of two speeds in either direction. For long moves, such as from one part of town to another, the outfit is drawn by a utility car or horses, but for progressing along a job the self-propelling feature is employed.

By disconnecting the blower and asphalt tank and connecting the water-measuring tank, the hot mixer may be used as an ordinary concrete mixer.

With this portable mixing plant and a gang of fifteen men the way department of the Milwaukee company has been able to take up and relay more than 180 sq. yd. of asphalt pavement between rails in a working day. The thickness of the paving is between 2 in. and 3 in., and the entire operating cost of the plant, including team charges but no depreciation or interest on the special investment, has been found to be about 42 cents per square yard for patch work. This includes tearing out, remixing and repaving with the old material, and adding such small amount of new material as may be required.

The procedure is to repair one track at a time and to maintain uninterrupted car operation over both tracks without blocking vehicular traffic except on one side of the street.

The gang is composed of the following men: One foreman, one man breaking up asphalt, five men preparing concrete sub-base and wheeling remixed asphalt, one man feeding charges to the mixer, one man painting paving stones with hot asphalt and applying cement to surface of finished pavement, one man running the mixer, three men raking, smoothing and tamping, and one night watchman, and one teamster. In addition to ripping up the old asphalt and relaying the pavement, this gang also keeps the street in safe operating condition. A two-horse general-utility team also is a part of this outfit.

On the job recently completed, a part of the work consisted in relaying the asphalt between the granite gage blocks on a busy double-track line. The procedure of the work from front to rear is as follows: The old asphalt surface is first picked up and broken into pieces about 6-in. square, the smaller sizes being more readily melted. The mixer is charged with approximately 8 cu. ft. of this old material and new asphalt in varying amounts, usually about 10 lb. per charge, is added in accordance with the character of the old mix.

About nine minutes' time is required for melting and mixing a charge. During the first six minutes the maximum hot blast is applied, the temperature being reduced for the last three minutes. The blast is furnished by a blower driven by the main motor. This blower operates in connection with two crude-oil burners, the flame from which is distributed in such a way that only the hot-air blast, and no flame, strike the mix, thus preventing burning. The construction of the mixer

is such that the material is continually raised in large buckets inside the drum, and cascaded from top of the drum down through the incoming hot blast to the reversed discharge chute, which spouts it to the farther side of the drum. Thus all material is subjected to repeated hot-blast baths, and the material itself aids in maintaining high temperature in the remotest sections of the drum. The oil consumption is about 50 gal. per day. Crude oil is purchased in tank cars and delivered to the job in a steel tank which holds 310 gal.

After a mix has been heated it is discharged into two-wheel Sterling concrete carts and immediately dumped in the track. Then the asphalt is raked, tamped and smoothed in the usual manner. Finally a surface is given it by rolling with a hand roller loaded with water.

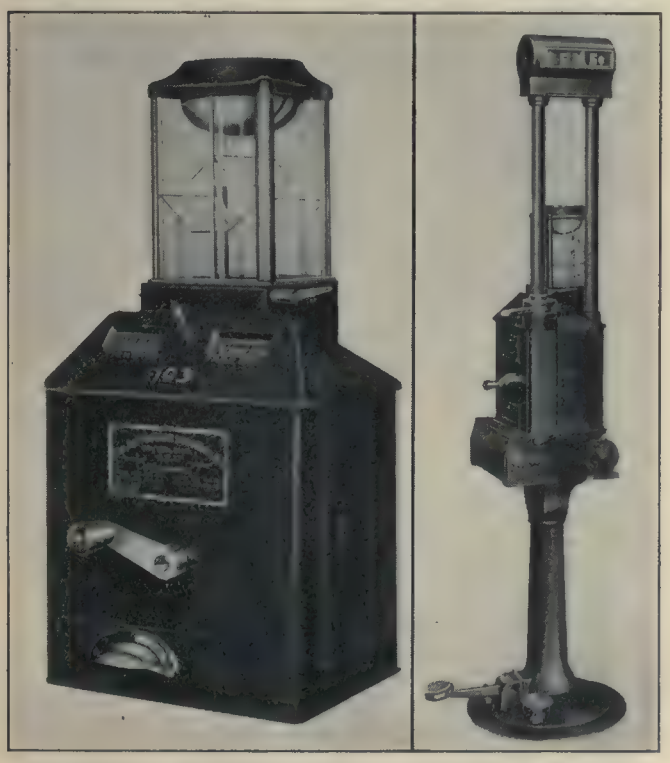
Representatives of the railway company state that the quality and speed of work performed with this hot-mixing outfit will improve with experience in its operation and that they are now satisfied that the unit costs, particularly for pickup and patch work, are considerably lower than those which usually obtain for similar work executed under old methods or under contract.

New Form of Cash and Ticket Fare Box

For some time inventors have been at work on the design of a registering fare box to handle tickets as well as coins. Otherwise, some other kind of fare register has to be used to register the tickets, a method more or less unsatisfactory when there is a large percentage of ticket fares, party because it necessitates a division of fares handled by the conductor and partly because the fares cannot be handled fast enough under heavy traffic conditions.

Several makes of fare boxes are now being put on the market adapted to receive and register in a single device both cash and ticket fares. The coins and tickets are separated automatically, the cash being registered and computed in dollars and cents, as in the ordinary fare box, and the tickets are counted, cancelled and delivered into a separate locked compartment of the box. One of the latest types of combination cash and ticket fare boxes is manufactured by the Dayton Fare Recorder Company of Dayton, Ohio, a description of which follows:

RECORDING FARE BOX WITH TRAVELING BELT ESPECIALLY DESIGNED FOR STATIONS



CASH AND TICKET FARE-BOX, MANUALLY OPERATED, AND ON ROTATABLE BASE WITH MOTOR DRIVE

The general appearance of the combination fare box is about the same as the cash fare box of the manufacturer that has been on the market for some years, the size and weight of the two boxes being practically the same. A view is shown in the first engraving. Cash fares and ticket fares are deposited in the same receiving box by the passengers, where they are examined by the conductor. When the handle at the front of the box is turned, the coins are separated from the tickets, and the total amount of money is computed in dollars and cents. The coins, after they are registered, pass into a money till, where they are immediately available for use by the conductor.

At the same time the ticket fares, as they are separated from the cash fares, are cancelled and delivered into the ticket box, from which they are removed at the end of the run or at the end of the day by an authorized employee of the company. The tickets are counted by means of a separate register contained in the fare box, the registrations being made by a small lever, which is pressed as each ticket is deposited in the fare box. A register bell is used to indicate the completion of each registration. An additional counter is provided when a register for transfers and other fares is desired.

In one type of the combination cash and ticket fare box a visual trip register and fare indicator are used to give greater prominence to the classification of fares as they are registered. The second illustration shows a combination fare box-register of this type, mounted on a rotatable base, adapted to change the position of the machine to suit the direction of travel of the car. The type of machine shown in the illustration is designed for use on center-entrance cars, and is provided with a two-way fare indicator, which shows the indications as fares are registered on both sides of the device so that the indications can be seen from all parts of the car. The machine is shown fitted with treadle mechanism for foot operation, but it may be operated by hand

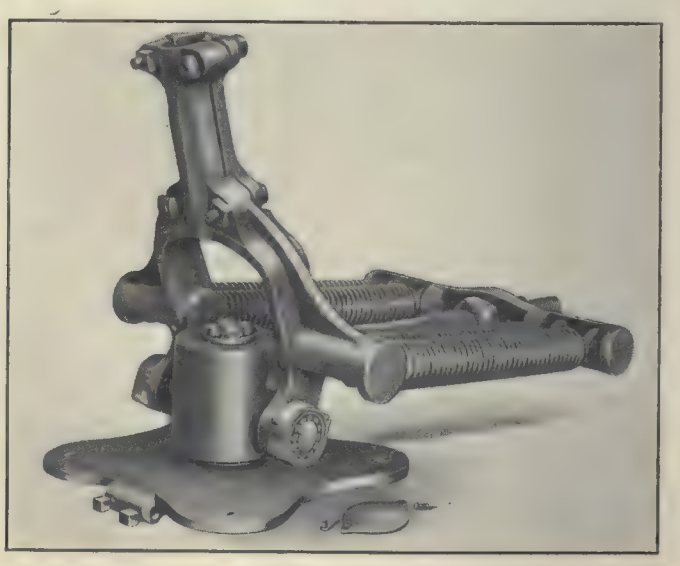
as well. Various modifications of the combination fare box-registers are made to suit the variable local conditions of street railway operation. The machine illustrated in this second view is shown fitted with an electric motor, which is also one of the more recent improvements applied to the operation of fare boxes. All the different types of fare boxes may be fitted with small motors of, say, 1/25 hp for electrical operation, the current being supplied direct from the trolley circuit. Except under conditions where the traffic is exceedingly heavy, however, it is entirely practicable to operate these fare boxes either manually by hand or with a foot treadle.

Still another type of fare box manufactured by the Dayton company is shown in the third engraving. This device consists of the regular cash fare-box fitted with a special traveling belt, upon which the coins fall as they are paid by the passengers, and are then carried on the belt in full view a sufficient interval of time to enable the attendant thoroughly to inspect them before they pass within the fare box to be registered. This type of device is especially adaptable for elevated, subway and suburban railway stations, and its greatest value consists in the rapidity and accuracy with which the fares may be handled during heavy rush hour traffic. The device is fitted with a motor for electrical operation, but provision is also made for manual operation if that should be preferred. This variety of machines shows that manufacturers of fare register equipments are now able to furnish suitable fare boxes for every condition of operation where fare boxes are at all adaptable for use.

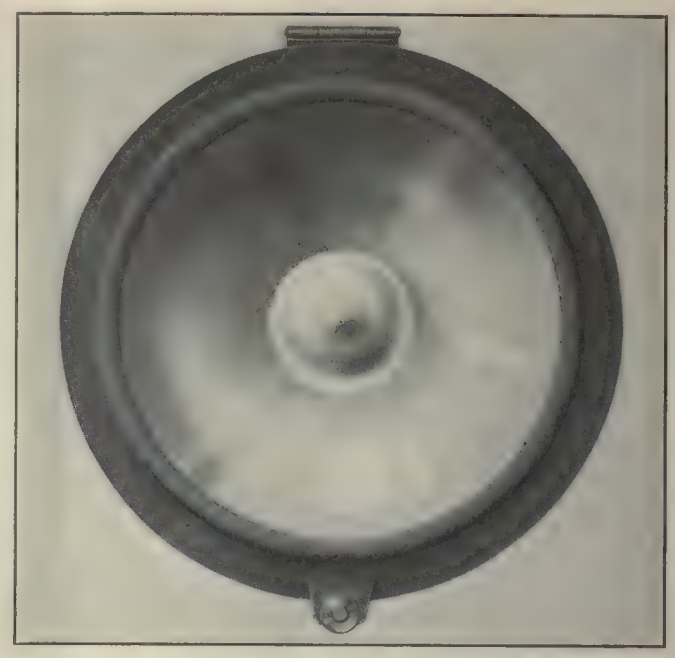
New Trolley Base and Headlight

The Trolley Supply Company, Canton, Ohio, has just placed upon the market two items of electric railway car equipment that possess a number of unique features. One of them is a roller-bearing trolley base which has been designed as a result of long experience in the manufacture of this type of equipment and it has the advantage of roller bearings on the side as well as around the center swivel pin. The roller bearings and their bushings are made of specially-treated, hardened steel, and they make the up and down as well as the sidewise motion as nearly frictionless as possible.

The tension bar is of solid steel, 1¼ in. in diameter. It is so placed that it takes up all the springs at the same time and thus prevents the possibility of adjustments that are not made evenly. One of the best features of the trolley base is that the tension increases as the pole rises and the further the pole is pulled the less tension there is against the wire. This insures safety at railroad crossings. In general, the new base contains a minimum number of parts, and owing to its flexibility, it permits an unusually large mileage to be obtained from the trolley wheels. The height of the base is 5½ in. and the weight is 100 lb.



ROLLER BEARING TROLLEY BASE



HEADLIGHT OF UNUSUAL LIGHTNESS

The new headlight that has been brought out by the same company is in line with the modern tendency to decrease weight in car equipment wherever possible. It is reported to be the lightest headlight ever designed, weighing but 7 lb. complete. However, strength and efficiency have not been sacrificed to attain this end, for the casing is constructed of No. 8 gage steel throughout, the front door being carried on an extra strong frame that is riveted in place. The head light is equipped with a triple-nickel-plated, polished brass reflector of special parabolic design which centralizes the rays of a concentrated-filament mazda bulb, throwing a strong beam of light far ahead of the car. The casing is absolutely dust and water proof, the front glass being fitted into a deep recess and the space between the glass and the door frame being tightly sealed with a special felt pad which serves also as an effective shock absorber.

This arrangement, although it renders the glass waterproof, provides for expansion and contraction. The front glass is 8⅜ in. in diameter, and the headlight can be supplied with either a 23-watt or a 36-watt bulb as desired. The overall diameter is 11½ in. and the depth from front to back is 6 in.

Spanish Bus Line Unsuccessful

The 37-mile motor-bus line between Huelva and Ayamonte, Spain, has been discontinued, after one year's service, owing to insufficient patronage. French cars were used, with a seating capacity of twelve passengers each.

A great obstacle to successful operation was the extremely bad state of the road. The line, in addition to serving the terminal towns, passed through Gibraleon, Cartaya and Lepe. It is understood that a line using Spanish cars is in operation between Cadiz, Medina Sidonia and Alcala de los Gazules, a total distance of about 35 miles.

Non-Splashing Electric Track Switch

The savings in time and labor that are effected by electric operation of track switches in urban service are of such importance that the practice has become more or less general, notwithstanding certain mechanical disadvantages which have heretofore existed. Most prominent, perhaps, among the unfortunate features of the solenoid-controlled switch have been the splashing of muddy water when the switch point is shifted, giving rise to serious objections on the part of pedestrians, and, in addition, where no means for locking the switch-point in position is provided, there is always the possibility of derailment due to movement of the switch between the trucks of a passing car.

These two difficulties have been absolutely eliminated in the improved electric track switch that was developed during the past year by the Collins Switch & Signal Company, and was shown for the first time at the Atlantic City Convention last fall. The device is now being placed on the market by the manufacturers, the United States Electric Signal Company, West Newton, Mass. The results of service tests on ten electric railways during the past winter have proved to be most satisfactory in every respect. The changes that have been shown by the tests to be desirable are practically negligible notwithstanding that the new switch constitutes a radical departure from previous designs, the only point of similarity being the use of motor current to throw the switch in one direction and by the non-use of motor current to throw it in the opposite direction as the trolley wheel passes under a contactor in advance of the switch point.

The starting contactor has two contacts and is mounted on the trolley wire approximately 60 ft. ahead of the switch point. A stopping contactor is mounted in advance of the frog and it is located at a point such that the last wheel of the car must be on or beyond the switch point before the trolley wheel reaches the stopping contactor. A box containing the resistance and the relays is mounted on the trolley pole most convenient to the switch point and a conduit runs from this under the pavement to the street box.

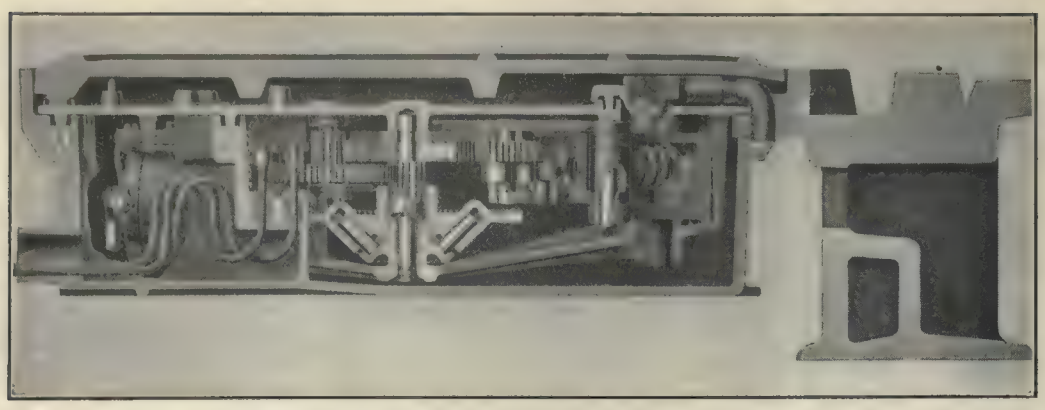
If the trolley wheel passes under the starting contactor with motor current on in the car, current will be fed from the trolley wire through a low-resistance relay in the relay box and thence to the car because the contact strip is insulated from the trolley wire and the car is supplied with power only through the relay when the trolley wheel rides on the contact strip the relay being connected to the trolley wire through a contact finger in the stopping contactor.

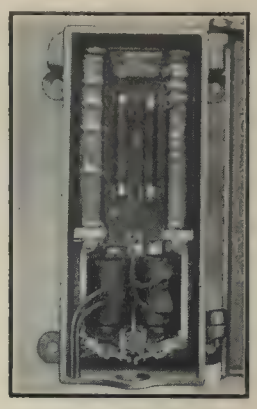
As soon as this relay is energized, its armature moves up and in so doing makes up a contact which sends current through a high-resistance relay whose armature moves slightly upward, resting under the armature of the low-resistance relay, holding it up. Both of these armatures remain up, as a stick circuit is fed through the high-resistance relay as soon as the armature of either relay reaches its top position. Should the trolley wheel stand on this contactor for an indefinite period, it would not burn out anything, for the circuits are made up only momentarily and as soon as the relays act the circuits are made up elsewhere.

NON-SPLASHING TRACK SWITCH—INSTALLATION AT SUMMER AND WASHINGTON STREETS, BOSTON

This stick circuit, which holds up the armature of the relays passes on through resistance to ground and a 110-volt tap is taken off of this resistance to run to a motor in the street box. The current to the armature of the motor is always fed in the same direction. The current to the fields of the motor, however, is fed first in one direction or the other, depending on which relay armature is uppermost. If the armature of the low-resistance relay is uppermost, the motor revolves in such a direction as to throw the switch for the curve. The motor is connected to the switch point through a chain of gears and a shaft which passes through an inner cover and is made water tight by means of a mercury seal. As the motor is geared it causes the switch point to move slowly.

As soon as the switch point has finished its stroke, the gears cause a clover-leaf-shaped cam to revolve, rubbing a roller and compressing a rigid spring. At a certain point in the revolution of the clover-leaf cam the spring takes the load off the motor and speeds up the gears, causing the pins of a simple clutch to fly up by centrifugal force. This disconnects the motor





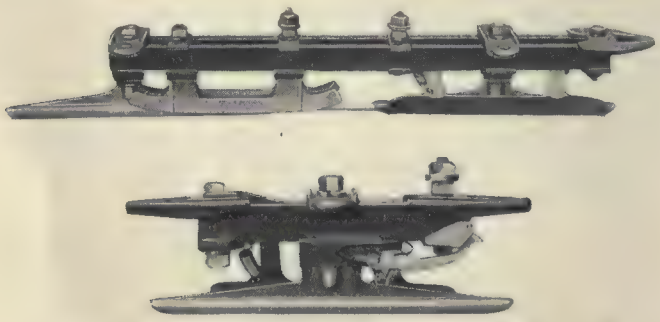
NON-SPLASHING TRACK SWITCH—INTERIOR VIEW OF STREET BOX; RELAY AND RESISTANCE BOX

from the gears and it remains disconnected so long as the motor runs. The disconnection is made so that the switch point can be thrown by the switch iron at all times, whether the motor is running or not. The same spring, which is a very positive one, acts as an anti-straddling device and holds the switch point rigidly in the position into which it is thrown.

As the trolley wheel leaves the starting contactor the motor is left running, and should a second car pass this contactor before the last wheel of the first car reaches the switch point, there will be no effect on the mechanism, for the circuits are already made up and the relay armatures are locked. Therefore, the motor could not be reversed to throw the switch between the trucks of the first car.

After the wheels of the car have all passed the switch point, the trolley wheel strikes the stopping contactor and raises for an instant a small lever. This temporarily opens the circuit that is feeding the motor and relays and allows the armatures of the relays to drop. As the circuit in the relay box is permanently opened when the relays drop, the opening of the circuit at the stopping contactor needs only to be temporary, and, although the contact is closed at the stopping contactor as the trolley wheel leaves it, there will be no complete circuit. The motor, therefore, will stop and the mechanism will be ready to operate again.

If a car approaches the starting contactor with the motor current off, there will be no action, as the trolley wheel crosses the first contact strip because only the low-resistance relay is connected to this first strip and this is so adjusted that the current consumed by the heaters, lights and compressor is not sufficient to lift its armature. As the trolley wheel reaches the second contact strip of the starting contactor, a circuit will be completed through the high-resistance relay and through a resistance to ground. This will complete the stick-circuit with the high-resistance relay armature above the other armature. The circuit will then be fed in the opposite direction through the motor fields and cause the motor to revolve in the opposite direction, throwing the switch for the straight track.



NON-SPLASHING TRACK SWITCH—STARTING AND STOPPING CONTACTORS

The starting contactor is very simply mounted on standard cars without taking up any slack in the trolley wire. It is only about one-third the size of any previous contactor used on electric track switches. The stopping contactor is about one-half the size of the starting contactor, and is mounted on a standard car. The relay and resistance box is also small. It is provided with a cut-out switch for deadening all the connections in the box. The main street box, of course, is the most interesting part of the device. It is 2 ft. x 1 ft. x 7 in. in dimensions and provided with a loose-fitting street cover to take the street traffic. There is an inner cover which has a flange running all the way around it and this flange sets into a ditch cast in the box.

The ditch is partially filled with mercury, so that by setting this cover in place the box is automatically sealed and made water-tight without depending upon workmen to make up any pipe joints or gaskets. The shaft which comes through this inner cover and which is connected to the switch point is also protected by a mercury seal. The wires running through the pipe under the street are brought to a hand hole and are here connected to wires running through stuffing boxes into the mechanism box so that if the workmen should fail to make the pipe water-tight still no water could get into the box. These wires coming up through the stuffing boxes have exposed ends which connect with spring contacts. The spring contacts, as well as the entire mechanism, are mounted on the inner cover so that the inner cover with all the mechanism can be picked up and another one slipped in its place just as one would replace a fuse, this being done without any pipe or wire disconnections. This is most advantageous, as it eliminates working in the street and dodging back and forth between cars when any repairs are to be made. The fact that only 110 volts are sent into this box instead of the full 550 volts previously used with street boxes is a most important one, for it largely eliminates the liability of electrical troubles due to moisture.

Summarized, the most important new features of this device are as follows: It does not splash mud and water; the switch cannot be thrown between the trucks of a car by a following movement under the contactor; the street box is automatically sealed without dependence on the proper making up of pipe joints or gaskets; a most positive anti-straddling device is provided; only 110 volts is sent into the street box; the entire mechanism can be lifted out of the street box without making any disconnections; the contactors are exceedingly small and simply mounted on standard cars; standing under the contactor for an indefinite period has no damaging effect on any part of the mechanism.

LONDON LETTER

The Subjects Discussed Are Largely Those Growing Out of Conditions Imposed by the War

(*From Our Regular Correspondent*)

Owing to the increased cost of living due to the war, a spirit of unrest seems to have overtaken industrial workers in Great Britain. The tramways and electric railways, whether owned by municipalities or companies, have not escaped this general discontent.

The threatened strike of engineers and mechanical workers on the London electric railways has been averted by the decision of the companies to grant the demands of the men. The four companies affected, the District Railway, the London Electric Railway, the Central London Railway and the City & South London Railway, have agreed to withdraw the existing war bonus of 2s. a week to the trades affected, and to make instead a permanent increase of 3s. a week. The increases were obtained as the result of a joint trade movement, the principal unions affected being the Amalgamated Society of Engineers and the Electrical Trades Union.

Unfortunately the London County Council does not appear to have been able to meet the views of its employees and London is therefore suffering a strike involving about 7000 tramwaymen. For the last few days no cars have been run except a few in the vicinity of Woolwich, which carry workmen engaged in the manufacture of munitions of war. The men claim that 5000 tramwaymen have gone to the war and that for months past the remainder have had to make up for the deficiency in drivers and conductors by working as much as fifteen hours a day. They demand shorter hours, a war bonus of 15 per cent to meet the extra cost of living, the abolition of certain penalties for lost mileage, etc. The strike fever has also extended to the employees of the Metropolitan Electric Tramways, Ltd., so that London for a day or two past has been tramless except in a few cases. At its regular meeting the London County Council confirmed the offer of the chairman of the highways committee of early arbitration if the men would resume work immediately.

The threatened strike of the Newcastle tramwaymen has been averted. Last month the Board of Trade was asked to intervene and Sir George Askwith has delivered his award as arbitrator. He gives 2s. 6d. per week extra to employees who are householders; 1s. 6d. to employees who are single men; and 1s. to employees who are eighteen years of age or under. This is less than the men demanded originally.

The Salford tramways committee, which faced a strike, has agreed to accept the suggestion of the men that the subject of an advance in wages to meet the increased cost of living due to the war should be referred to arbitration. The original demand of the men was for a 15 per cent advance in wages. The tramways committee offered a bonus of 2s. a week on wages less than 28s. The threatened strike has thus been averted, but there is still resentment against the action of the committee in employing women as conductors on the tramcars.

The British Electric Traction Company, which operates many tramways, especially in the Midlands, is also threatened with strikes in the South Staffordshire area. The men there are asking for an increase of a halfpenny an hour in wages and are protesting against the employment of women. No definite action, however, has yet taken place.

At a recent meeting of the Plymouth Corporation Tramways committee it was reported that an agreement had been entered into with the Devonport & District Tramways for the sale by the company to the Corporation of the company's undertaking on Tramway Act terms. Under the agreement, it was stated, the company would transfer its lines to the Corporation on Oct. 2, 1915. The price to be paid for the property is to be fixed by arbitration, the payment of the purchase money to be made within a month of the Corporation obtaining the necessary borrowing powers.

An appeal has been issued for electrical engineers and others with technical knowledge of electrical matters to give spare time to an emergency service which is being organized to maintain the efficiency of the electric lighting, power, and tramway stations. Only men ineligible for military service are asked for, and they are required to make up the shortage of labor which at present exists in many electricity works in consequence of the war. Many switchboard attendants and other workers have enlisted or were called back to the reserve at the outbreak of hostilities, and this has left some of the stations with no margin for emergency and illness. Moreover, many young men are unable to join the colors because they cannot obtain immediate substitutes. Volunteers will be required to work four hours a day or four hours midnight service on alternate nights. They will be remunerated in accordance with the existing rates at the works at which they are to be employed.

The consulting electrical engineer of the Bristol Corporation, the city valuer, the city engineer and the city electrical engineer, have been instructed to value that portion of the Bristol Tramways which is purchasable by the town under Sec. 22 of the Tramways Act. The purchasable part includes 25 route miles out of a total of 31 route miles, and includes also the St. George and the Counterslip power stations and the depots of the company. It is reported that the general valuation amounts to £610,981, based on the present prices of material.

Cardiff tramwaymen have passed a resolution protesting against the employment of women as car conductors, and warning the Corporation that if it persists in the policy of hiring women the men will not work with the new members of the staff.

The highways committee of the London County Council reports that the number of fatal accidents caused by the working of the electric tramways in 1914 was twenty-five, as compared with thirty-seven in 1913. The proportion was one to every 21,391,734 passengers carried, as against one to every 13,802,000 in the previous year. The improvement is regarded as especially encouraging in view of the traffic conditions that arose on account of the war. The life-guard on the cars was brought into operation in seventy-four cases, and in not a single instance did it fail to act. The total traffic receipts from the tramways for the year ended March 31, 1915, were £2,323,053 from lines worked by electric traction, and £10,261 from lines worked by horse traction, or a grand total of £2,333,314. The receipts for the previous year under the same heads were £2,181,344, £21,146 and £2,202,490 respectively. The Council is recommended not to apply, at present, for powers to run trail cars north of the Thames, the Commissioner of Police having pointed out that in present circumstances it is not likely that the Council could secure delivery of the necessary additional cars from the manufacturers for some time to come.

As announced in the ELECTRIC RAILWAY JOURNAL of May 22, the Right Hon. Sir Edgar Speyer, chairman of the Underground Electric Railways, Ltd., London, has resigned his seat on the board. The directors have since appointed the Right Hon. Lord George Hamilton, the deputy chairman, to act as chairman of the company.

The companies under the control of the Underground Electric Railways, London, propose to deposit a bill in Parliament giving them power to bring the companies of the group into still closer association as regards their working and finances. The most important part of the scheme is the provision for payment into a common fund of the whole or part of the balances of the revenues of all the companies for each half-year after providing for interest on debentures, guaranteed stocks, preference shares or stocks (other than the second preference stock of the Metropolitan District Railway), depreciation, and reserve, and any other payments which may be specially provided for in the agreement. Another clause provides that the common fund may be used to make up any insufficiency in the net revenue of any of the companies to meet fixed and other charges.

For the last two months experiments have been in progress at certain tube stations where escalators are not in use with the object of evolving a means of saving passengers' time in getting from the trains out into the street. A new lift system has now been introduced at three important tube stations, Picadilly Circus, Euston and Great Central. These new lifts are electrically controlled, and carry no liftman, the gates opening and closing and the lift starting automatically. Men are stationed at the top and bottom of the lift to direct passengers. Similar lifts will be introduced at several other important centers in the near future.

A. C. S.

News of Electric Railways

NEW YORK'S PUBLIC SERVICE COMMISSIONS

Divergent Views Regarding Regulation Expressed Before Constitutional Convention

The proposal of Senator Foley to the Constitutional Convention of New York for an amendment making public service commissioners bi-partisan, constitutional officers, removable only by the Senate was attacked at a hearing on May 12 by Frank W. Stevens, former chairman of the Public Service Commission for the Second District of New York. Mr. Stevens said that bi-partisanship assumed that the Democrats were going to do something iniquitous and that they needed watching by the Republicans, or vice versa. Mr. Stevens also objected to the provision to give the Senate the right to confirm the appointment of public service commissioners. He did not believe that the qualifications of the commissioners were improved because the men nominated for appointment were approved by the Senate. It was his idea that public opinion should be brought up to a point where it would be difficult to put into the office of public service commissioner a man not fully qualified to do the work. He did not take kindly to the suggestion of making Supreme Court justices members of the public service commission. In this connection he said that a public service commissioner must often ignore precedent and not be afraid to reverse himself. This was opposed to the attitude of the judiciary on most questions.

On May 19 William R. Willcox, formerly chairman of the commission for the first district, advocated making commissioners constitutional officers removable only by the Legislature or the Senate, on recommendation of the Governor. He also suggested that the term of office of the commissioners be made ten years instead of five as at present. He favored commissions of five members, but said they should be bi-partisan. He rejected the suggestion that the commission for New York City should be selected by the Mayor. He also opposed the transfer of subway construction from the commission to the Board of Estimate. There should be no review of commission orders by the courts except as to questions of law. The power of the commissions to regulate the issue of stocks and bonds should not be curtailed. John N. Carlisle, former member of the commission for the second district, also urged constitutional protection for the members of the commissions.

Seymour Van Santvoord, chairman of the commission for the second district on May 26 advocated that the public service commissions be made constitutional bodies and that the office be surrounded with all the safeguards afforded justices of the Supreme Court. There was no department of the state government in which personal integrity and moral courage were so necessary as in the public service commissions. The terms of office of the commissioners, their powers and duties, their method of removal, and perhaps their salaries should be fixed in the constitution. The salaries should be large enough and the office so secure and honorable that no member could be tempted to act otherwise than in the public interest. Mr. Van Santvoord opposed the inclusion of the bi-partisan idea in the statute. This automatically injected politics into the commission. Mr. Van Santvoord expressed himself in favor of a court review of the commission's decisions and in favor of the removal from the Legislature of the power to regulate rates by enactment. Corporations and individuals should feel that they do not have to "tend their fences" in the Legislature in order to secure justice in the matter of rates. Chairman Van Santvoord's views were generally concurred in by Edward E. McCall, chairman of the first district commission, and by Martin S. Decker, who has just finished his second term as a member of the up-state board.

On the other hand an amendment to the constitution that would abolish the present two public service commissions, and replace them by two public utilities commissions, with the same powers but a different status, has been recommended to the Constitutional Convention by W. M. K. Olcott. Mr. Olcott would leave intact the organizations built up by the present commissions, and would pass them over with all the records and unfinished business of the commissions to the two new public utility commissions he would create. These would have the same jurisdiction, scope and authority as the present commissions, and the new commissioners, like the existing ones, would be appointed for five years at $15,000 a year. Mr. Olcott's board would be a bi-partisan one.

MEXICO TRAMWAYS A WAR VICTIM

How the Mexican Reign of Terror Has Affected the Mexico City Utilities

The directors of the Mexico Tramways have issued a circular to the bond and shareholders of that undertaking, together with those of the subsidiary concerns in which it is interested—namely, the Mexican Light & Power Company, the Mexican Electric Light Company and the Pachuca Light & Power Company. According to the London *Financial Times* the condition disclosed is serious in the extreme. The control of the tramways has been taken out of the directors' hands, and the board sets forth the events which have led up to the present position. First of all, however, the directors emphasize the fact that the existing situation has not arisen from any financial weakness on the part of the companies affected, all of which have been prosperous from inception, and but for successive political crises should still be earning their bond interest and satisfactory dividends.

The frequent changes of administrative control of the country have each been accompanied by large issues of paper money, with the result that the exchange rate of the peso is now not more than 5d., as against the normal rate of 25d. As further emissions of paper money are expected, it is anticipated that exchange will continue to decline. Unfortunately the company was obliged to accept this paper currency for fares, with the result that a large proportion of its gross receipts was useless for buying exchange on London and Toronto for the purpose of paying coupons or purchasing materials for maintenance and current operations. Matters appear to have come to a crisis in October last, for the circular states that, after the capture of the city of Mexico by General Carranza some eight months ago, labor unions were formed by the employees of the tramways company, and the following demands made upon the management: An increase of 25 per cent in wages; recognition of the unions; an agreement that all changes in employees must be approved by the unions; various operating conditions which would have had the effect of subjecting the company to the control of the unions. The company was given only forty-eight hours in which to accede to these demands, and as the conditions would obviously have ruined the business a refusal was returned to the men; thereupon a strike was immediately proclaimed and the operation of the tramways ceased in consequence. The company maintains that it could have found plenty of independent employees to operate the cars had it been provided with protection, but this could not be obtained.

After a few days the authorities took over the operation of the system themselves, on the ground that the service must be maintained for the convenience of the public. They then doubled the salaries of many of the staff employed by the month, and gave to the remainder of the employees a 25 per cent increase in wages. The tramways have since been in the hands of and operated by officials appointed by the leaders temporarily in power. As a result of this procedure operating costs rose speedily, while the character of the service and the condition of the equipment deteriorated rapidly, the new officials having had no experience in tramway operation or the handling of men. In addition, the maintenance of the cars was badly neglected, so that a very considerable proportion of the rolling stock is now laid up awaiting repair. For a short time the receipts were paid to the company's bankers, but subsequently the authorities directed that the earnings should be paid to the Government treasury. It is now practically impossible to communicate

with the company's officials in Mexico, but the latest information states that when Carranza's representative was recently driven from the city of Mexico by Zapata he took with him the controllers of the cars, thereby rendering them unfit for service, and all traffic has, consequently ceased.

So far the authorities have not taken over control of the business of the Mexican Light & Power Company, the Mexican Electric Light Company and the Pachuca Light & Power Company, and the property of these undertakings has, therefore, been very little injured. The employees have, however, had to be given higher wages, while, as receipts are to a large extent in paper, there remains no available surplus after providing for the maintenance which is absolutely necessary to keep the plant in operation. The board is conferring with the trustees for the bondholders as to what further steps should be taken to protect the bondholders' interests, but the members feel that the future of the enterprises they control must necessarily depend upon the development of political conditions in Mexico and the attitude of the United States towards that country.

CHICAGO WORKING AGREEMENT TO BE ARBITRATED

Refusal to grant the employees of the Chicago (Ill.) Surface Lines an increase in wages has closed the first stage of the negotiations. This was followed by a poll in which 96 per cent of the employees voted to support their leaders in obtaining a satisfactory wage and working agreement. Although this was essentially a strike vote the possibilities of such a move are considered remote, because both the employees and the company have expressed themselves as ready to accept arbitration.

Similar steps have been taken by the employees of the elevated railroads. A delegation met President Britton I. Budd, who offered to renew the old contract despite diminished income and voluntarily agreed to make concessions with respect to working conditions. In view of the decreased patronage and the general business depression, however, Mr. Budd refused to consider an increase in wages at this time. The result of this conference has been submitted to the employees and they also have voted on the matter. Arbitration will be employed to reach a final agreement.

PROPOSED RESERVE CORPS OF ENGINEERS

Early in the present year an informal conference was held in New York at which the establishment of a volunteer reserve corps of engineers for the United States Army, representing all branches of the engineering profession, was discussed. The following five national engineering societies were represented: American Institute of Consulting Engineers, American Society of Mechanical Engineers, American Institute of Mining Engineers, American Society of Civil Engineers, and the American Institute of Electrical Engineers.

The matter was considered at the meeting of the board of directors of the A. I. E. E., held on Feb. 19, and resolutions were adopted at that time to the effect that the board was in hearty sympathy with the proposed movement, and with a view to giving enthusiastic support and cooperation in any plan or method of procedure proposed by the war department, President Paul M. Lincoln was authorized to appoint a committee to represent the institute in connection therewith. In accordance with this action, President Lincoln has appointed the following committee: Bion J. Arnold, chairman, Chicago, Ill., John Harisberger, Seattle, Wash., Ralph D. Mershon, New York, A. M. Schoen, Atlanta, Ga., and Charles W. Stone, Schenectady, N. Y.

The other national engineering societies named previously have also appointed committees with the following chairmen: A. I. C. E., Ralph D. Mershon, New York; A. S. M. E., Maj. William H. Wiley, New York; A. I. M. E., Dr. Henry S. Drinker, South Bethlehem, Pa.; A. S. C. E., William Barclay Parsons, New York.

These various committees will, it is understood, form a joint committee representing the entire engineering profession, to co-operate with the war department, which is now giving careful study to the matter with a view to formulating a comprehensive plan of a permanent nature, whereby the services of the members of the profession, who so desire, will be available if needed.

THE CLEVELAND CARHOUSE CONTRACT

The committee on street railways of the City Council of Cleveland, Ohio, spent May 20, 21 and 24 hearing the evidence on the charge of favoritism in making contracts by the Cleveland Railway Company and the alleged connivance of Peter Witt, street railway commissioner, in the matter. This charge, made by Roderick D. Grant, a contractor, was filed in writing with the City Council on May 10 by Councilman Fitzgerald. On the third day the Cleveland Railway submitted a tabulation of all the building contracts that have been made during the last four years. This showed that every contract had been awarded to the lowest bidder. The committee expects to have its report ready for submission to Council at the next regular meeting. In commenting on the case Councilman Reynolds expressed the opinion that the whole matter was the outcome of competition between contractors and the natural bitterness that a defeated contractor might entertain.

On May 25 the Council approved an additional allowance of one-half of 1 cent per car mile to cover the increase of 2 cents per hour in the wages of motormen and conductors which was agreed upon some time ago. This will amount to about $150,000 a year.

The company received a franchise for a line on West Thirty-fifth Street from the West Twenty-fifth Street line to the city limits.

TOLEDO FRANCHISE DISCUSSION

A conference of the special franchise committee of the City Council of Toledo, Ohio, and representatives of the Toledo Railways & Light Company was held on May 27. Several phases of the tentative twenty-five-year franchise prepared by the committee were discussed. One of the questions was that the city shall have an appraisal of the property if the franchise should run twenty-five years. Attorney Thomas H. Tracy, representing the company, insisted that the city should pay half the expenses of such an appraisal. This was passed over, but he also argued that if any other company should purchase the property at that time, it must pay the appraised value and that any other company receiving a franchise must take over the present company's properties. No definite agreement was reached on this point. It was agreed that some changes, mostly relating to phraseology, should be made in sections 18, 19 and 23. No agreement has been reached as to the amount of interest earnings to be allowed the company during a twelve-month try-out period and as to whether this period shall be an uninterrupted one.

SUPPLEMENTARY ARBITRATION IN DETROIT

The agreement made at the time of the decision to arbitrate the Whaling case provided that any grievances the members of Division No. 26 of the Amalgamated Association might have against the Detroit United Railway would be considered at the close of the Whaling case. In consequence the union has presented several requests to F. W. Brooks, general manager of the company. The most important request, perhaps, is that questions of discipline in which the union is not satisfied with the decision of the general superintendent shall be referred to a representative of the company and a representative of the union for adjustment and, failing agreement, shall be referred to the state commissioner of conciliation.

CLEVELAND TERMINAL PROJECTS

The application of Cleveland, Akron & Canton Terminal Railroad for a franchise for a subway under East Fifty-fifth Street at Cleveland was discussed at an open meeting at the Chamber of Commerce on May 26, and again before the committee of the whole of the Council on May 28. O. C. Barber, who is at the head of the movement, said that he did not know who would furnish the funds for construction. Both he and Attorney W. M. White declared that no railroad had anything to do with the proposition, but that they hoped to interest the railroads in the service the new terminal will furnish. The construction of the line would involve the expenditure of about $15,000,000. The four-track line would be operated by electricity from a power house located in the southern part of the city where it is proposed to have the road come to the surface.

Council as a committee of the whole also heard arguments of the Cleveland & Youngstown Railroad for the vacation of forty streets between East Ninth and East Thirty-fourth Streets in order to give it sufficient ground for its right-of-way. Several property owners objected to the plan. They contend that it would cut their property off and damage it in other ways. The company, however, has purchased 700 parcels of ground and 800 houses, all valued at about $1,500,000, in the section where it desires to build its terminal, and it is believed that it will be able to force its way through under existing laws. Attorney John L. Cannon, representing the company, said he had no intention of attempting this, as he believed the company and the city would be able to arrive at an agreement satisfactory to both.

This company will operate an electric railway reaching Shaker Heights, an elegant residence district, but it will also be in position to bring the cars of all the roads that cross it into the city at one point where it is believed a combined steam and interurban passenger station will be constructed. A law was recently enacted that will allow steam and electric roads to co-operate in the construction of union stations, but Mr. Cannon refused to say whether any of the steam roads will be financially interested in the terminal project.

The case to test the right of the city, under its new charter, to build a street railway without the consents of owners of abutting property was filed in the Supreme Court on May 27. This is the case involving the section of Euclid Avenue between East Twenty-second and East Fortieth Streets, or "Millionaires' Row." The hearing for a temporary injunction was set for June 3.

Pasadena Considers Municipal Railway.—A committee of fifty citizens of Pasadena, Cal., to be known as the advisory transportation committee, was appointed on May 18 to obtain data on the proposal to build a municipal railroad from Pasadena to Los Angeles.

Massachusetts Compensation Lost. — The Massachusetts Senate has killed by a voice vote the six bills attached to the report of the special commission appointed by Governor Walsh to consider workmen's compensation. This ends any further attempt to secure workmen's compensation legislation in Massachusetts this year.

Interurban Consolidation Bill Passed.—The interurban consolidation bill permitting the consolidation of interurban lines in Texas has been passed by the Legislature. The object of this bill is to allow the interurban lines from Denison to Dallas, and from Dallas to Waco, controlled by the Strickand interests, to be merged under one management.

Richmond Blanket Franchise Proposal Withdrawn.—Henry W. Anderson, representing the Virginia Railway & Power Company, Richmond, Va., in a short statement, supplemented by a personal talk, recently withdrew the petition and tentative ordinance introduced in the City Council by the company, asking for a blanket franchise, and left the entire proposition to the street committee of the Council.

Toledo Newspaper Case.—The Toledo Newspaper Company and Negley D. Cochran, editor of the Toledo *News-Bee*, which were fined for contempt of court by Judge John M. Killits of the Federal District Court in connection with news items and editorials relating to the street railway injunction suit, have appealed their case to the United States Circuit Court of Appeals at Cincinnati on May 26. It is said that the case may not come up until May or June of next year unless there is a request from the appellants to advance it for hearing.

Brooklyn Marginal Bill Signed.—Governor Whitman has signed the Brooklyn marginal railroad bill. The bill makes possible the conclusion of a contract between the city and the trunk line railroads under which the road, when constructed, will be operated jointly by all the railroads. Plans for the railroad call for an electrically operated elevated line to cost $15,000,000, including the property acquired. The road will link together terminals along the South Brooklyn waterfront such as those of the Bush Terminal Company and the New York Dock Company.

Public Utilities Commission for Alberta.—The Alberta Legislature has passed an act for the creation of a public utilities commission for the Province. It provides for the appointment of three commissioners to hold office for ten years, one of whom shall be chairman. The commissioners are to devote their whole time to the commission's work and may be reappointed upon the expiration of their ten years' term, but no commissioner may remain in office after attaining seventy years of age. Otherwise a commissioner can be removed only by the Lieutenant-Governor upon an address of the Legislature.

Right to Compel Extension Lacking.—The Public Service Commission of Pennsylvania declared recently that it had not the power, under the act creating it, to compel a public service company to extend its facilities beyond the territory covered by its charter or amendments thereto. The city of Scranton passed an ordinance authorizing the extension and operation of the lines of the Scranton Railway from the present end of the tracks on Luzerne Street to other localities. The company refused to accept the ordinance or make the extension and the city of Scranton filed a complaint with the commission.

Terminal Talk at Columbus.—H. M. Daugherty, well-known attorney, stated recently that all the land needed for the proposed electric railway terminal bounded by Front, Rich and Town Streets is now owned in fee simple by the projectors of the improvement. He said that the terminal building will be connected to High Street through a building on High Street and Wall Alley. An office building will be erected on this site. The franchise requires that work on the terminal structure be begun by Jan. 1, 1917. The Scioto Valley Traction Company, the Columbus, Delaware & Marion Railway and two or three other electric railways are expected to be tenants of the terminal structure.

Bus Bids in New York.—Three bids were submitted on May 31 for new motor bus routes in New York. The Fifth Avenue Coach Company, which operates the existing bus service, made an alternative proposal, suggesting that the city might enter into a contract with it for the extension of its present lines on the same principle as has been followed in the extension of the elevated roads. The People's 5-Cent Bus Line failed to make any offer, but its place was taken by a new company, represented by O. C. Brunner and W. T. Ridley, who want to run buses on the zone plan, with the city divided into three zones in each of which 3 cents would be charged. The third bid was received from the New York Motor Bus Company.

Governor's Charge to the Pennsylvania Commission.—Governor Brumbaugh of Pennsylvania has laid down a definite policy to be followed by the reorganized Public Service Commission. In the course of his remarks the Governor said: "The commission must be fair to the corporations, but it must not be fair to them at the expense of the public. It must take the place of that competition which has virtually ceased to exist in public utilities and see that public service companies charge no higher rates than they would if they had direct competition. You have a great opportunity for service to the people of the Commonwealth. You are expected to act as regulators of conditions in public utilities. It is my desire that business of the body be attended to with promptness and dispatch. It is to be a full-time commission and will, although it has judicial functions, sit like a business board."

Service Abandoned in Alexandria.—Receivers have been appointed for the Southern Traction & Power Company, Alexandria, La., and the company has abandoned the operation of its lines. This action followed the failure of negotiations for the sale of the property to the city and the imposition by the city of requirements with respect to improvements considered by the company to be too onerous. In a statement which he issued I. B. White, vice-president and general manager of the company, said: "We dealt with the city in good faith, believing that it would take over the property. At a considerable loss to the stockholders we continued to operate it. Now since all hopes of the city taking it at the price and upon the terms named have been abandoned, and since it is called upon to make expenditures which it is utterly unable to meet, there is nothing left for us to do, except to cease operation."

PROGRAMS OF ASSOCIATION MEETINGS

National Electric Light Association

At first it was proposed to crowd the work of the convention of the National Electric Light Association, beginning June 8 at San Francisco, into three days, but various reasons forbade limiting the sessions to Tuesday, Wednesday and Thursday; and the extra sessions will therefore allow the subject-matter to be treated in a more leisurely way, favorable to fuller discussion. Moreover, as the special trains do not pull out on their return trips until Saturday and Sunday, good use will be made of some of the intervening time. Another feature of interest is the proposed shifting of the public policy meeting from Wednesday to Thursday evening, owing to the difficulty in securing a suitable hall for Wednesday night. Usually at the conventions there have been no sessions on Wednesday afternoon, because of the objection to holding the delegates together for sessions morning, afternoon and evening. With the public policy meeting on Thursday evening, the afternoon recess will also fall on that day, and the afternoon will be devoted to an official visit to the electrical exhibits at the Panama-Pacific Exposition.

Central Electric Railway Association

Arrangements have been made for the movement of two special cars from Indianapolis, Ind., to Cleveland, Ohio, and return, for the summer meeting of the Central Electric Railway Association, on the S. S. *City of Erie*, leaving Cleveland on the morning of June 17. The cars will be moved on the following schedule on June 16, 1915:

INTERSTATE PUBLIC SERVICE COMPANY

Leave Indianapolis, Ind	6:00 A. M.
Arrive Columbus, Ohio	12:35 P. M.
Arrive Marion, Ohio	2:35 P. M.
Arrive Bucyrus, Ohio	3:15 P. M.
Arrive Cleveland, Ohio	7:35 P. M.

FORT WAYNE & NORTHERN INDIANA TRACTION COMPANY

Leave Indianapolis, Ind	7:00 A. M.
Arrive Muncie, Ind	9:15 A. M.
Arrive Fort Wayne, Ind	11:50 A. M.
Arrive Lima, Ohio	2:15 P. M.
Arrive Cleveland, Ohio	7:50 P. M.

Returning, these cars will leave Cleveland Saturday, June 19, 1915, shortly after the arrival of the boat. No provision has been made in these schedules to stop for lunch, but arrangements will be made for box lunches at Columbus, Ohio, and Fort Wayne, Ind.

These cars are available for railway and supply members, their families and invited guests. The program of papers for the meeting was published in the ELECTRIC RAILWAY JOURNAL of May 29.

Central Electric Railway Accountants' Association

The twenty-seventh meeting of the Central Electric Railway Accountants' Association will be held at the Severin Hotel, Indianapolis, Ind., on June 11 and 12. The executive committee will meet on the morning of June 11. Following the presentation of the report of the executive committee and the address of Charles L. Henry, president of the association, the following papers will be presented:

"The Relation of the Accounting Department to the Mechanical Department," by R. N. Hemming, superintendent of motive power of the Union Traction Company of Indiana.

"Analysis of the Balance Sheet," by L. T. Hixson, auditor of the Terre Haute, Indianapolis & Eastern Traction Company.

After the reading of these papers the compiling committee and the standard passenger and freight committee will report.

The program of papers for the session on June 12 follows:

"The General Principles of Accounting as Between Common Carriers and Manufacturers," by P. C. Johnson, general auditor of the Prest-O-Lite Company, Indianapolis.

"Electric Light & Power Accounting by Combined Railway and Light Property," by Oren A. Small, auditor of the Benton Harbor-St. Joe Railway & Light Company, Benton Harbor, Mich.

"The Small Electric Line Handling Carload Freight," by James S. Clark, auditor of the Marion & Bluffton Traction Company, Bluffton, Ind.

Financial and Corporate

ANNUAL REPORTS

Portland Railway, Light & Power Company

The comparative statement of income, profit and loss of the Portland Railway, Light & Power Company, Portland, Ore., for the calendar years 1913 and 1914 follows:

	1914	1913
Gross earnings	$6,273,171	$6,723,742
Operating expenses	2,695,356	2,856,981
Net earnings	$3,577,815	$3,866,761
Taxes	$568,527	$441,329
*Bridge rentals	45,198	46,936
Interest	2,127,480	1,961,666
Total fixed charges	$2,741,205	$2,449,931
Surplus	$836,610	$1,416,830

*Additional bridge rentals amounting to $16,267 in 1914 and $16,903 in 1913 are included in operating expenses.

The record for 1914 shows that the gross earnings decreased $450,571 or 6.7 per cent as compared to 1913. The operating expenses decreased $161,625 or 5.7 per cent, so that the net earnings decreased $288,946 or 7.5 per cent. Fixed charges increased $291,274 or 11.9 per cent, mostly on account of an increase of 28.8 per cent in taxes and 8.5 per cent in interest, with the result that the surplus showed a decrease of $580,220 or 41 per cent.

The report states that this unsatisfactory showing is due to a continuation of the depressed business conditions prevailing in 1913, and to the competition of the Northwestern Electric Company. The effect of the general depression in business is shown by a decrease of 6 per cent in railway earnings, passengers carried having fallen from 94,014,368 in 1913 to 89,934,644 in 1914. Only one small part of the railway system, the Mt. Hood line, showed any increase in passenger earnings. The electric sales were affected both by the business depression and the competition of the Northwestern Electric Company, the number of customers being reduced from 42,062 to 37,938 and the earnings 7.8 per cent. The operating expenses were cut as low as consistent with good service and proper maintenance of the property, so that, in spite of the heavy decrease in gross earnings, the operating ratio for the year stood at 43 per cent, compared with 42.5 per cent in 1913.

Since the first of 1915, it is said conditions have not improved, and the company is now facing further losses in its railway department, owing to competition from jitney automobiles and motor buses, which have increased rapidly in this part of the country. Relief by ordinance compelling fair competition, however, is expected. The company does not anticipate further material losses of existing business on account of its electric competitor. Moreover, by reason of greater economy in public expenditures and the lowering of the tax levy, taxes payable in 1915 will be materially less than in the year 1914. The capital expenditures required in 1915 will be the smallest in ten years. The Willamette Valley Southern Railway, controlled by the Portland Railway, Light & Power Company, started operation Jan. 31, 1915. This line, thirty-two miles in length, should build up a large business both in passengers and freight.

Very little new construction work was undertaken in 1914 except railway work required by the city authorities or to connect up new light and power customers. The total of $531,130 was only slightly more than one-sixth of the average annual capital expenditures made during the years from 1906 to 1913, inclusive.

Utah Securities Corporation

The Utah Securities Corporation, New York, N. Y., which controls the Utah Power & Light Company and the Utah Light & Traction Company, has issued an unusually complete sixty-page report containing detailed financial data for each of the companies and a consolidated profit and loss statement and balance sheet for all the companies. The report also gives descriptions and photographs of the properties owned. The street railway property in Salt Lake City has 145 miles of track.

Since the incorporation, in 1912, the company's manage-

ment has been largely occupied in acquiring additional properties, retiring underlying securities, clearing titles, rearranging rates and readjusting franchise conditions. The construction period for the immediate future and the work of readjustment and reorganization is now practically completed, and the company finds itself for the first time in position to proceed along ordinary operating lines. From now on President S. Z. Mitchell expects an improvement in operating results.

The total gross earnings from all sources of the operating properties now controlled, intercompany charges eliminated, for the twelve months ended March 31, 1915, were $4,640,126, as compared with $4,474,261 for the previous twelve months. The net earnings were $2,284,477, as compared with $2,361,320 for the previous twelve months. Earnings were affected by the depressed condition of the copper and other mining industries in the territory served, occasioned by the European war. These industries are now resuming operations along normal lines and an improvement in business conditions and power output is expected.

The consolidated income statement of the Utah Securities Corporation and subsidiaries, after including the profit on the redemption at a discount of ten-year 6 per cent notes, shows a balance of $987,659 after all charges. The consolidated balance sheet shows total reserves of $2,935,905 and a total surplus of $2,813,997.

Republic Railway & Light Company

The Republic Railway & Light Company, New York, N. Y., and subsidiary companies report consolidated earnings for the year ended Dec. 31, 1914, as follows: Gross earnings, $3,001,461; operating expenses and taxes, $1,856,467; net earnings, $1,144,994; interest charges, $679,987; net income, exclusive of depreciation, $465,007; previous surplus, $1,180,099; total surplus, $1,645,106; other deductions, including preferred dividends, $738,328; final surplus, $906,778. The gross earnings increased $31,443 for the year.

The amount expended during the year for improvements was $602,127. The report states that the directors are now working upon plans for refunding on Jan. 1, 1916, $3,000,000 of 5 per cent secured gold notes of the Republic Railway & Light Company and $4,844,000 of first consolidated refunding mortgage 5 per cent gold bonds of the Mahoning & Shenango Railway & Light Company, which mature on that date.

During the year steps were taken to consolidate as many properties as possible to save taxes, facilitate operation, reduce expenses and improve conditions for refinancing. Thus far six companies have been eliminated. The Mahoning & Shenango Railway & Light Company absorbed by purchase the Sharon & New Castle Railways and the Youngstown-Sharon Railway & Light Company, and by merger the Sharon & Wheatland Street Railway, the Valley Street Railway and the Wheatland Street Railway. The Youngstown & Sharon Street Railway purchased the Youngstown Consolidated Gas & Electric Company.

The J. G. White Companies

The J. G. White Companies has issued its report for the ten months ended Dec. 31, 1914. As the company has changed its fiscal year to conform with the calendar year instead of the year ending Feb. 28, no comparison of earnings is available. Following is the surplus and undivided profit account as of Dec. 31: Balance March 1, 1914, $780,268; written off for depreciation of securities acquired prior to Jan. 1, 1914, or March 1, 1914, and for doubtful accounts contracted prior to that date, $120,820; balance, $659,448; profit for ten months from March 1 to Dec. 31, 1914, all companies, $44,817; total, $704,265; preferred dividends, $145,363; profit and loss surplus, $558,902.

A revaluation of securities owned on April 24, 1914, on the basis of sales prices agreed for those sold but not delivered, market prices for a few other large blocks and balance-sheet prices for the remainder would show an increase in surplus of more than $250,000, bringing this actual present surplus to more than $800,000.

The report states that the amount of cash of all companies on hand on Dec. 31 last was $509,668, and bills and accounts receivable, after having made ample provision for doubtful accounts, $516,300, making total current assets of $1,025,969. The total debts of the company on the same date, exclusive of dividends on the preferred stock declared and since paid, were $629,602.

It is stated that general financial and business conditions, intensified by the European war, made it impossible to secure large engineering or construction work, and even more impossible to arrange any large flotations or promotions of either new projects or consolidations of existing business. During the last few months, however, new business in encouraging, though not large, volume has been arranged and prospects are more encouraging.

INTERBOROUGH-METROPOLITAN PLAN APPROVED

Consolidation Will Bring Capital of New Company Into Conformity with Net Value of Assets of Old Holding Company

Stockholders of the Interborough-Metropolitan Company, New York, N. Y., the holding corporation of the subway and elevated lines, on June 1 approved the readjustment plan providing for the consolidation of the company with the Finance & Holding Corporation, the new company to have a nominal capital of about $50,000.000. The vote on the plan stood 1,106,527 shares for, of which 355,445 were preferred and 751,082 common, and 5635 shares against.

Under the plan the present 5 per cent cumulative preferred stock will be replaced by a 6 per cent non-cumulative issue. New common stock is to be issued in shares without par value. The project as outlined by the directors is to permit the restoration of dividends as soon as possible on the preferred stock in lieu of the sacrifice by the stockholders of their claims on back dividends of the present cumulative 5 per cent issue, now amounting to about 40 per cent.

Prior to this stockholders' meeting the Public Service Commission had decided that the proposed consolidation was not in violation of Section 54 of the Public Service law. This section prohibits a street railroad corporation from acquiring the capital stock of a similar corporation without the consent of the commission. Theodore P. Shonts, president of the company, wrote to the commission stating that neither the Interborough Rapid Transit Company nor the New York Railways formed a contracting party in the consolidation, which would in no way affect the relation of these roads to the public. He said the plan had the hearty support of the bankers who had purchased the bonds of the rapid transit company, and added:

"With respect to the proposed consolidation, it is proper to bear in mind that the necessary effect will be to place the declared capital of the new company at a sum in conformity with the net value of the assets of the Interborough-Metropolitan Company over and beyond its debts. For a long period the company has recognized the desirability of taking this course, and thereby writing off upon the books of the company the very large depreciation which has ensued in its original investments in the stocks of the Metropolitan Street Railway and the Metropolitan Securities Company."

The Interborough-Consolidated Corporation has been incorporated with a capital of $50,403,634 to succeed the Interborough-Metropolitan Company and the Finance & Holding Corporation, operating in the counties of Greater New York and Westchester. The directors include August Belmont, T. P. Shonts, Andrew Freedman and Edward R. Bacon.

SAN FRANCISCO-OAKLAND VALUATION

The California Railroad Commission on May 24 issued its findings upon the value of the properties of San Francisco-Oakland Terminal Railways, Oakland, Cal. These properties consist of the Oakland Traction Company, owning the street railway system in Oakland, and the so-called "Key Route System," which owns the interurban railway and ferry system between San Francisco, Oakland and Berkeley. The valuation of the commission included also the property of the Oakland Terminal Company, which is a large land-owning corporation owned by the San Francisco-Oakland Terminal Railways.

The commission finds the reproduction cost of all of these

properties, with all allowances, to be $26,912,865. These allowances include land multiples, etc., amounting to approximately $900,000. The reproduction cost less depreciation amounts to $23,641,893. The net indebtedness of the railways and the Oakland Terminal Company, including all outstanding bonds, notes, etc., amounts to approximately $21,000,000. A large portion of the lands owned by the San Francisco-Oakland Terminal Railways and by the Oakland Terminal Company are non-operative property. In its report the commission states that the reproduction cost of the properties actually used in the operation of the railways amounts to $20,354,746 and that the reproduction cost less depreciation of these operative properties amounts to $17,314,213.

The engineers of the railways and of the commission came to a practical agreement on all of the physical properties. The differences, when the case was finally submitted, amounted to only a few thousand dollars. The chief remaining item of difference was the matter of lands. The company had claimed the value of its lands to be $17,687,000, but the engineers of the commission had estimated these lands at $6,843,000, the chief difference being in the appraised value of the company's tide lands. The real estate expert for the railway estimated these lands to be worth $21,780 per acre, while the engineers of the commission had estimated $7,500 per acre. The commission finally found a value of $12,500 per acre for these lands for the purpose of the present proceeding. No value has been fixed on the property of the entire system as a "going concern."

NEW YORK MERGER AUTHORIZED

The Public Service Commission for the Second District of New York has approved the corporate merger of the New York, Westchester & Boston Railway and the Westchester Northern Railroad. The New York, Westchester & Boston Railway at present operates over the Harlem River & Port Chester tracks from Harlem River to 174th Street, New York, and thence over its own tracks to North Avenue, New Rochelle. It also operates a branch from Mount Vernon to White Plains and is to construct a road to Port Chester. The Westchester Northern Railroad is to be built from the New York, Westchester & Boston Railway terminus at White Plains, forming a continuous line of road, through Westchester County to Danbury, Conn., with a branch to Brewster. The Westchester Northern Railroad is to construct its line in Connecticut under the Connecticut statute. The time within which it must expend 10 per cent of its capital stock and complete the construction in New York State was extended by the last Legislature to five and ten years respectively from March 1, 1915.

The consolidated road will connect with the New Haven lines at various points, including a connection with what is called the Poughkeepsie Bridge Route, thus affording the New Haven a new New York tidewater point for coal. It will also open up to commuters new sections of northern Westchester County. The capital stock of the new company, the New York, Westchester & Boston Railway, will not exceed in amount the sum of the stock of the two present companies at par. No bonds or other evidences of indebtedness are to be issued in consideration of the merger. More than two-thirds of the capital stock of each company has consented to the merger. No stock or other securities will be issued without the further approval of the commission.

Bay State Street Railway, Boston, Mass.—At a recent hearing before the Massachusetts Public Service Commission on the application of the Bay State Street Railway to issue $1,500,000 of preferred stock, as noted in the ELECTRIC RAILWAY JOURNAL of May 8, counsel for the company stated what work has been done in the way of new construction and improvements and what the financial standing and requirements of the company are. The commission took the petition under consideration for the purpose of making an independent valuation of the new property before passing on the issue.

Calumet & South Chicago Railway, Chicago, Ill.—The Calumet & South Chicago Railway has petitioned the Illinois Public Utilities Commission for authority to issue $500,000 of additional first mortgage 5 per cent bonds.

Carolina Power & Light Company, Raleigh, N. C.—W. C. Langley & Company, New York, has sold at 93½ a block of first mortgage 5 per cent bonds of the Carolina Power & Light Company, dated 1908 and due in 1938. Of an authorized issue of $5,000,000, $2,582,000 is outstanding.

Chicago (Ill.) City Railway.—The Chicago City Railway has applied to the Illinois Public Utilities Commission for permission to issue $3,050,000 of first mortgage bonds.

Chicago (Ill.) Railways.—The Chicago Railways has applied to the Illinois Public Utilities Commission for authority to issue $3,145,000 of first mortgage 5 per cent bonds.

Cincinnati (Ohio) Traction Company.—The Ohio Supreme Court by affirmation recently held that the Cincinnati Traction Company under its 1896 franchise is accountable to the city for 6 per cent of its gross earnings from all traffic within the city limits, including the part retained by the interurban lines. A judgment was awarded to the city for $5,410 for additional tax on fares collected in 1905, and it is reported that a demand for a similar tax in later years will be made.

Columbus Railway, Power & Light Company, Columbus, Ohio.—E. W. Clark & Company, Philadelphia, has sold at 99½ and interest, to yield 5½ per cent, $1,200,000 of 5 per cent one-year gold coupon notes, series B, of the Columbus Railway, Power & Light Company. These notes are dated June 1, 1915, and due on June 1, 1916. They are a direct obligation secured by a deposit of first refunding and extension mortgage 5 per cent gold bonds of the company at 80 per cent of their face value.

Electric Short Line Terminal Company, Minneapolis, Minn.—The Electric Short Line Terminal Company is offering for sale $500,000 of full-paid stock. The proceeds will be used for the improvement of the terminal properties and the extension of the Electric Short Line Railway. Besides this line the Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company operates into the terminal.

Fairmount Park Transportation Company, Philadelphia, Pa.—The property of the Fairmount Park Transportation Company will be offered for sale on June 22, subject to the first mortgage of $750,000. Previous reference to this sale was made in the ELECTRIC RAILWAY JOURNAL of May 15.

Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, Minneapolis, Minn.—Three-year 6 per cent notes of the Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company to the amount of $750,000 have been bought jointly by the J. G. White Engineering Corporation and the General Electric Company, New York, and Stevens, Chapman & Company, Minneapolis. The money secured will be used to complete the "Dan Patch" line into the Minneapolis terminal and to furnish new equipment.

Pacific Gas & Electric Company, San Francisco, Cal.—The California Railroad Commission has issued a supplemental order in the matter of the application of Pacific Gas & Electric Company for authority to issue 19,226 shares of common capital stock. The commission's original order provided that the company should make certain adjustments as to depreciation accounts, and also that it should present in writing to the commission an agreement that the authorization of this stock should not be used as a basis for the determination of rates. The company has now complied with these conditions. Announcement is made that from the date of the initial offering on June 3, 1914, to April 30, 1915, a period of eleven months, 4,430 subscriptions, aggregating $9,895,200, have been received for the company's new issue of first preferred 6 per cent cumulative stock. Of this amount $6,039,600 (60 per cent) was taken by stockholders under the original offering and $3,855,600 (40 per cent) has been subscribed for by employees and customers of the company, and others. Since Jan. 1, 1915, $1,089,800 has been sold, little or none being disposed of outside of California.

People's Railway, Wilmington, Del.—The Wilmington & Philadelphia Traction Company is reported to have purchased the People's Railway property, including the lease on Brandywine Springs Park. The consideration is not stated.

Southern Traction & Power Company, Alexandria, La.—On the application of the City Savings Bank & Trust

Company, trustee, I. B. White and C. F. Crockett have been appointed receivers for the Southern Traction & Power Company. An explanatory statement of the management is noted elsewhere in this issue.

United Railroads, San Francisco, Cal.—A discussion of some tentative plan for the reorganization of the affairs of the United Railroads of San Francisco to comply with the recent order of the California Railroad Commission is current in financial circles. President Lilienthal said that since "the State has told us how it expects us to handle our affairs, we may have to work out a definite plan to carry out its directions." It has been reported unofficially that there may be a reduction of from 25 to 40 per cent in the face value of the outstanding 4 per cent bonds, which at present total about $23,000,000. The bondholders would be partially compensated by an increase in the interest rate to 5 per cent. These bonds are quoted in the market at about 46½. A readjustment of the outstanding stock might also be undertaken.

United Railways of St. Louis, St. Louis, Mo.—The Board of Aldermen on May 21 voted in favor of appointing a committee of five to confer with officers of the United Railways of St. Louis in an endeavor to compromise the mill-tax cases now pending in the courts.

DIVIDENDS DECLARED

Arkansas Valley Railway, Light & Power Company, Pueblo, Col., quarterly, 1¾ per cent, preferred.

Brooklyn (N. Y.) Rapid Transit Company, quarterly, 1½ per cent.

El Paso (Tex.) Electric Company, 3 per cent, preferred.

Frankford & Southwark Passenger Railway, Philadelphia, Pa., quarterly, $4.50.

Louisville (Ky.) Traction Company, quarterly, 1 per cent, common.

Second & Third Streets Passenger Railway, Philadelphia, Pa., quarterly, $3.

Wisconsin-Minnesota Light & Power Company, Eau Claire, Wis., quarterly, 1¾ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
CITIES SERVICE COMPANY, NEW YORK, N. Y.					
1m., Apr., '15	$342,337	$15,298	$327,039	$40,833	$286,206
1 " " '14	337,223	8,963	328,260	29,167	299,093
12 " " '15	3,946,539	137,607	3,808,932	466,667	3,342,265
12 " " '14	3,076,962	93,863	2,983,099	239,729	2,743,370
EL PASO (TEX.) ELECTRIC COMPANY					
1m., Mar., '15	$78,329	*$45,188	$33,141	$4,230	$28,911
1 " " '14	88,469	*49,945	38,524	4,669	33,855
12 " " '15	1,020,918	*559,699	461,219	50,672	410,547
12 " " '14	925,120	*505,657	419,464	50,921	‡376,999
GALVESTON-HOUSTON ELECTRIC COMPANY, GALVESTON, TEX.					
1m., Mar., '15	$160,200	*$101,329	$58,870	$35,409	$23,461
1 " " '14	195,536	*113,739	81,797	38,931	42,866
12 " " '15	2,327,395	*1,268,159	1,059,236	434,574	624,662
12 " " '14	2,423,574	*1,375,477	1,048,097	431,326	616,771
HOUGHTON COUNTY TRACTION COMPANY, HOUGHTON, MICH.					
1m., Mar., '15	$21,699	*$13,057	$8,642	$5,456	$3,186
1 " " '14	24,039	*13,952	10,087	5,635	4,452
12 " " '15	269,991	*177,431	92,560	66,884	25,676
12 " " '14	291,847	*176,352	115,496	67,316	48,200
JACKSONVILLE (FLA.) TRACTION COMPANY					
1m., Mar., '15	$53,498	*$37,426	$16,071	$15,644	$427
1 " " '14	64,342	*38,965	25,377	12,901	12,476
12 " " '15	688,368	*463,721	224,647	156,522	68,025
12 " " '14	704,689	*448,701	255,988	149,532	106,456
NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO.					
1m., Apr., '15	$279,281	$183,537	$95,744	$51,423	$44,321
1 " " '14	287,718	173,321	114,397	50,331	64,066
4 " " '15	1,101,351	709,451	391,900	204,437	187,463
4 " " '14	1,080,883	668,301	412,582	200,155	212,427
PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.					
1m., Mar., '15	$23,307	*$15,166	$8,141	$7,796	$345
1 " " '14	25,237	*16,236	9,001	7,679	1,322
12 " " '15	299,729	*191,946	107,783	91,683	16,100
12 " " '14	298,017	*195,434	102,583	90,976	11,607
PENSACOLA (FLA.) ELECTRIC COMPANY					
1m., Mar., '15	$19,183	*$11,339	$7,843	$7,268	$575
1 " " '14	23,051	*14,536	8,515	7,238	1,277
12 " " '15	255,205	*162,205	93,000	86,951	6,049
12 " " '14	284,206	*180,930	103,276	83,712	19,564

*Includes taxes. ‡Includes non-operating income.

Traffic and Transportation

THE JITNEY BUS

New York Commission on Recent State Measure—Dallas, San Antonio and Youngstown Developments

The State law in New York governing the operation of the jitney bus went into effect immediately upon its being signed by Governor Whitman. The Public Service Commission of the Second District received so many requests for an expression as to the effect and enforcement of the provisions of the statute that the following unofficial statement was made at the commission's offices on May 28:

"It appears that the auto bus law which has been in effect for the last two years has been repealed by the enactment of the jitney bus law, and that it is no longer necessary for persons and corporations desiring to operate auto bus lines on State highways to come to the commission for certificates of approval. It will be necessary, however, for all persons and corporations owning and operating stage routes, bus lines or motor vehicles carrying passengers for a fare of 15 cents or less upon any street, avenue or public place in any city of the State, except the city of New York, to procure first the consent of the local authorities and next a certificate of convenience from the Public Service Commission. The commission is not prepared to announce any general policy in considering such applications in advance thereof."

The Board of City Commissioners of Dallas, Tex., has passed an ordinance regulating jitneys in lieu of the ordinance passed by the previous administration which was to have become effective a few days ago. The new ordinance eliminating the bond feature went into effect on May 25. Under the new ordinances the applicant for a jitney license must submit to an examination by the City Health Officer before the license is granted; he must run his car continuously not less than six hours each day except Sunday; he must follow a stipulated route; must be examined by the city automobile inspector as to his knowledge of running an automobile. A license good until May 1, 1916, is to be issued upon payment of $75. Violation of the regulations of the ordinance is punishable by a fine of $200, and the Judge of the Corporation Court has authority to forfeit licenses without any refund on unearned portions. A protest has been made to the commissioners requesting the license be reduced to $50 a year.

Judge S. G. Tayloe of the Forty-fifth District Court at San Antonio, Tex., announced recently that he would render a decision sustaining the general demurrers of the City of San Antonio in the jitney case. As a result the ordinance regulating the operation of jitneys passed several months ago by the City Council is declared constitutional. Application for a temporary injunction to restrain the enforcement of the San Antonio ordinance was filed in the Forty-fifth District Court on March 27 by R. P. Green, president of the Jitney Owners' Association. The ordinance was to have gone into effect on March 28, but Judge Tayloe granted a temporary restraining order and set a hearing on the plea for perpetuation of the writ for April 9. The case, however, was continued from time to time, awaiting the decision of the Court of Criminal Appeals of Texas in the Fort Worth case, decided against the jitney as noted in the ELECTRIC RAILWAY JOURNAL of May 22, page 1005.

A regulatory ordinance was passed recently in Youngstown, Ohio, to go into effect on June 1. An indemnity bond in the sum of $5,000 is required for each machine operated. There is also a provision fixing a license fee of $25 a year for each car. In Youngstown the regular eight and twelve hour jitneys have been dropping out fast after a little experience, but the cars operated for only a few hours have remained as a source of trouble. These machines are operated mostly between 5 p. m. and 8 p. m. by people with other means of livelihood. With stipulations requiring a bond demanding a premium of $200 a year and a license fee of $25 it is expected that the ordinance will eliminate the rush-hour jitneys.

In Vancouver, B. C., the City Council was scored on May 15 by the grand jury for its neglect in not passing suitable regulations for the control of the jitney traffic, and for allowing jitneys to enter into unfair competition with the British Columbia Electric Railway.

ILLINOIS COMMISSION ON JITNEY

Following Hearing Jitney Company Is Restrained from Operating Without Certificate of Necessity

Jurisdiction over jitney buses was assumed by the Illinois Public Utilities Commission in a ruling made on June 2 by Judge Owen P. Thompson, one of the commissioners, following a hearing on the petition of the Jacksonville (Ill.) Railway and W. B. Miser versus L. F. O'Donnell et al., doing business as the Motor Transportation Company of Jacksonville. The hearing was held in the commission's office in the State Capitol at Springfield.

The defendant company is restrained from operating motor buses on the jitney plan until it has obtained a certificate of convenience and necessity from the utilities commission. In his oral ruling, which will be the basis for a ruling by the full commission to be issued within a few days, Judge Thompson held that motor buses attempting to do the same sort of transportation business as is done by street railways are amenable to the same restrictions and come within the jurisdiction of the commission under the State Utilities Act. Furthermore, he expressed the belief that the commission will not grant permits to jitney companies to operate along streets in any city where there is adequate street railway service. The jitney owner must also incorporate his business under the laws of the State and come to the commission armed with the proper franchise or other permit from the city in which he expects to operate.

T. J. Condon, an attorney of Springfield, represented the O'Donnell company at the hearing. He argued that a jitney was nothing more nor less than a bus. It had no established line from which it could not deviate and had no established system. For this reason it should not be classed as a public utility unless buses operated by transfer companies and others were to be so classed.

H. I. Green, Champaign, attorney for the Jacksonville Railway, declared that the jitney was a bidder for the business of the street railway, and that it operated cars at regular intervals along designated streets and for the same fare as was charged by the street railway. He said it was in every respect a public utility.

C. J. Sero, of the Tri-City Railway, Rock Island, attended the hearing and assisted the Jacksonville company in its arguments.

The text of Judge Thompson's decision, announced after the hearing, is as follows:

"Just what degree of control should be exercised by public utility commissions having jurisdiction over those engaged in public service similar to that conferred upon this commission by the Legislature of this State has not been passed upon by this commission or any other body of like jurisdiction or by any of the courts of the State. In other words, this question is a new one, and must be governed by the act relating to the supervisory control over public utilities by State authority.

"From general information obtained through newspapers and periodicals, we learn that some of the cities in the United States where the so-called jitney buses are in use have passed various ordinances restricting such use by requiring the payment of a license fee for the use of the streets and in some instances requiring the entering into a bond by the company to indemnify against property loss or for personal injury on account of the negligence of the operators of such vehicles.

"It seems clear from the reading of the law under which this commission acts that the use of the jitney bus as shown by the evidence in this case brings the character of business within the jurisdiction of this commission. This commission has jurisdiction over common carriers, and where the service rendered is to the public generally, or where the person or corporation holding himself or itself out as offering to the public transportation from place to place for hire and with an established route and a fixed schedule, such facts are amply sufficient to bring the business of that character under the law and require their regulation and control.

"While the means of transportation is other and different from that furnished by the ordinary street car, it is of the same general character. Street cars operating upon the streets are subject to regulation and control by law. This commission has authority under the law to inquire into the character of the service rendered and the rates or charges made for such service. They are required to furnish a schedule as to the rates and also as to the movement of the cars.

"A street railroad is necessarily a monopoly along the streets where it operates. So long as it can furnish adequate service at reasonable rates no other street car company would be authorized to invade the territory where it renders service. Public corporations, like street railroads, have no means by which to obtain money for the operation of their business except such as is obtained from the public. The public are interested in a public utility for the reason that they rely upon it for service. The public utility can render that service only through the support that is given it by patronage. The public's interest goes to rates and service and is not concerned as to the individual or what the corporation is that renders the service.

"It follows, therefore, that if the jitneys enter upon the use of the streets to carry people for hire and ply their business along streets occupied or used by street railroads engaged in the same general class of business, the result must necessarily be that the operation of the jitney bus will reduce the income or revenues of the street railroad in proportion to the business it takes from the railroad, and if the service being offered by the utility already organized and operating in the field is adequate and reasonable in rates, there would be no necessity for another public utility to operate in that field.

"Prior to the enactment of the public utility law of this and other States, the only means for the regulation of the service and rates of public service corporations rested in competition. With such comprehensive law for the regulation of public utilities as exists in this State, competition is no longer essential to the protection of the public, but that protection is found in the authority granted the commission to investigate all matters concerning rates and service and make such rules concerning the same as are found to be just and equitable.

"We do not wish to be understood as holding or intimating that cases may not arise where it would be a public convenience and necessity to have the so-called jitney buses in operation. A certificate of convenience and necessity might be granted for the transaction of such business along streets and avenues of the cities and villages where no adequate or sufficient transportation is offered by any other public service corporation, and when such a case is presented to this commission, and if it is held that such certificate should issue, the commission will do so upon the condition that the company wanting to conduct such business shall first obtain all necessary licenses or permits which the local authorities shall require.

"In what is here said with reference to this case, we are simply following the law concerning public utility companies and giving renewed expression to the principle that this commission will not favor granting the right to any new public utility to invade the field where another utility operates and is able to render adequate service at reasonable rates.

"Since the law authorizes this commission to say what rates are reasonable and what character of service is adequate, it must go a step farther and make such rules as will protect the life of the public service corporations which are required under its control to serve the public."

RAILWAYS ENTER THE BUS FIELD

W. H. McGrath, vice-president of the Puget Sound Traction, Light & Power Company, Seattle, Wash., announced recently that the company, beginning on June 1, would place three twelve-passenger stages in operation between Auburn and Buckley, a distance of 21 miles. The business will be conducted under the name of the Washington Auto Bus Company, for which incorporation papers have been filed in Olympia. The new corporation is capitalized at $25,000, and the trustees will be the managers of the Stone & Webster properties in the various cities in the State. These are: L. H. Bean, Tacoma; A. L. Kempster, Seattle; D. C. Barnes, Everett; and L. R. Coffin, Bellingham. Mr. McGrath is quoted as stating that if conditions warrant the company may extend its field from the long hauls in the comparatively sparsely settled sections to the cities.

Some of the officers of the Southwest Missouri Railroad, Webb City, Mo., have organized the Auto Transportation Company and have purchased two Indiana and two Packard trucks. Each of these cars has a capacity of twenty passengers. One of these cars is being operated from the terminal of the electric railway in Carthage to Jasper, a town of about 2000 inhabitants, 12 miles away. Another is being operated from the terminal of the electric railway in Galena, Kan., to Baxter Springs, a town of about 1000, 9 miles away. The other two are being operated between Joplin and Neosho, a town of about 4000, 20 miles away.

JITNEY AN ELECTION ISSUE AT LOS ANGELES

On June 1 the citizens of Los Angeles elected a new administration and voted on a number of referendums. Among the latter was one on the jitney bus, fathered by the Jitney Bus Association. The ordinance proposed by the association contained no provision for franchises, taxes or indemnity and even proposed a cut in the license fee from $2.50 to $1 a month. It also proposed to transfer traffic regulation from the police department to the Board of Public Utilities.

At the election the voters rejected the jitney men's ordinance by a majority of 8100. The ordinance of the Common Council, against which an injunction had been obtained, will now come up before the Superior Court of Los Angeles County, which has already decided in favor of an exactly similar ordinance in Venice. Splendid campaign work was done voluntarily by the railway employees.

To expose the worthlessness of this ordinance, the employees of the Los Angeles Railway organized voluntarily a trolleymen's welfare league. One work of this organization was the preparation of a pamphlet entitled "The Street Car and the Jitney Bus," in which the economics of the problem were discussed from every angle. This pamphlet was distributed among the employees of the company and among a number of outsiders.

One of the circulars used in the campaign was headed "Vote 'No' June 1." It said in brief that the proposed initiative ordinance fostered by the autobus owners and operators association would repeal the city's present ordinance, passed unanimously by the City Council; eliminate the $5,000 bond required of jitney bus operators for the protection of the public; make it possible for the jitney operators to charge any price they choose; fix a monthly license tax of only $1; reduce the distance prescribed to govern jitney stops, and eliminate the requirement that jitneys operate all the way between advertised terminals.

The pamphlet by Norman Sterry, "The Street Car and the Jitney Bus," distributed by the Trolleymen's Welfare League, was concluded as follows:

"Is it fair that the condition described should prevail? We leave it to the sober and intelligent judgment of the people of this community, confident in the sense of justice and of fair play that we believe pervades the minds and sentiments of a great majority of the people of this wonderful commonwealth, and we respectfully urge that as the first step in settling this question you vote against the adoption of the initiative jitney bus ordinance at the election next Tuesday."

In addition the Los Angeles Railway placed its attitude on the initiative jitney ordinance before the public. It sent a letter dealing with the curtailments forced upon it by the jitney, to all manufacturers and supply houses in Los Angeles, with whom it has commercial dealings and to large manufacturers generally. This letter was signed by C. A. Henderson as purchasing agent. A similar letter, except that it began "Since you are interested financially with us in the welfare of the city," was sent to all banks and large business interests generally. This letter was signed by Mr. Henderson as treasurer. One of the significant statements contained in the letter follows:

"Because of the competition to which we are subjected through unregulated jitney bus sniping, it has been necessary to reduce our shop work to five days a week instead of six, and to seven hours a day instead of eight, with consequent decrease in the amount of supplies purchased, and a decrease of about $430,000 a year in pay rolls, which money eventually would find its way through the business channels of the city. This decrease in the payroll is equal to laying off 477 men."

Seattle Service Order Modified.—The Public Service Commission of Washington recently filed a second order against the Puget Sound Traction, Light & Power Company, Seattle, relative to service on the Fauntleroy and Alki Point lines, a previous order to the commission requiring cars sufficient to seat all passengers having been declared unreasonable by the Federal District Court. The commission now proposes to require seating capacity equal to about 90 per cent of the traffic during the rush hours of the late afternoon.

Handling Informal Complaints.—Upon motion of Commissioner William Hayward, the Public Service Commission for the First District of New York has appointed a committee of two on informal complaints. The chairman appointed Commissioners Hayward and George V. S. Williams as the committee. At least once in two weeks this committee will review all informal complaints and the correspondence connected therewith, and report to the commission what action should be taken to obtain effective results.

New Rules for Baggage.—The new rules for checking baggage made necessary by a recent amendment to the Interstate Commerce Act went into effect on June 2. Hereafter persons checking baggage for interstate transportation will be required to sign a declaration of its value on a form which the baggage master will provide. The new act makes it a misdemeanor to misrepresent the value of baggage or any interstate shipment. It will not be necessary, however, for owners of baggage to sign these declarations in person.

Standard Seating Space Fixed.—The Public Service Commission for the First District of New York has established the standard seating space for each passenger to be allowed on the longitudinal seats of street surface railroad cars as 17.78 inches. This is the average space occupied by each passenger upon such cars according to 800 different cases observed by the commission's inspectors. The establishment of a standard by the commission is mainly for the guidance of the transit bureau in determining the loading and overloading of cars.

Five-Cent Fare Within City.—In the case of the City of Seattle against the Puget Sound Electric Railway the Public Service Commission of the State of Washington hold that the company is required to carry passengers from Yesler Way to all points within the city limits of Seattle for a 5-cent fare. At present the 5-cent fare extends only as far as Spokane Street. The charge from Yesler Way to Davis Station is 12 cents and that to Floraville 14 cents. The order of the commission does not affect the rate to The Meadows, which is just outside the city limits.

Rhode Island Booklet Issued.—The Rhode Island Company, Providence, R. I., has issued an official timetable covering all lines under its operation, which is to be distributed free to the public. The book also contains the closing time and receiving stations for the electric railway express service. The timetable and guide was authorized by the trustees of the company and prepared for distribution by President A. E. Potter. The booklet contains thirty-two pages, with an index for the guidance to the various tables. Placards have been placed in a conspicuous place for the benefit of the public, informing them where the timetables may be obtained.

Traffic in Toronto.—On account of the reduction in receipts the Toronto (Ont.) Railway has found it necessary to reduce expenses, and the company has laid off seven men from the blacksmith shop, three from the fender room and twenty-five shedmen. One hundred other men are to be used as extra crews on the extra runs during the rush hours. R. J. Fleming, general manager of the company, says that the receipts for April were about $35,000 less than for April last year, and that during the first seventeen days of May they were $30,000 less than for the same period a year ago. Mr. Fleming admitted that the business has been affected somewhat by the jitneys, but he attributed the decrease in the traffic to conditions generally, to the number of soldiers who have gone to the war, and to the closing of factories and laying off of hands by manufacturing concerns. The city solicitor has been instructed by the Board of Control to take immediate action to prevent the company from reducing the number of cars in commission.

Personal Mention

Sir Edgar Speyer, who resigned recently as chairman of the Underground Electric Railways, Ltd., London, England, arrived at New York on the *America* on June 3. He expects to spend the summer at Bar Harbor, Maine.

Lord George Hamilton, deputy chairman of the Underground Electric Railways, Ltd., London, England, has been elected chairman of the company to succeed Sir Edgar Speyer, resigned.

Mr. Freeman T. Eagleson, Akron, Ohio, special counsel in the office of Attorney General Edward C. Turner, has been designated as counsel for the Ohio Public Utilities Commission to succeed Mr. Lawrence K. Langdon, whose appointment as a member of the commission is referred to elsewhere in this column.

Mr. Allen F. Edwards, vice-president in charge of purchases of the Detroit (Mich.) United Railway, was elected treasurer by the board of directors at a meeting held May 27 to fill the vacancy caused by the death of George H. Russel. Mr. Edwards will add the duties of treasurer to those of his present position. The board did not elect a director to succeed Mr. Russel.

Mr. C. O. Jenks, general manager of the Spokane, Portland & Seattle Railway at Portland, Ore., has been elected also a member of the board of directors and vice-president and general manager of the Spokane & Inland Empire Railway, Spokane, Wash., succeeding W. D. Scott, deceased. He has been elected also vice-president and general manager of the Pacific & Eastern Railway, with jurisdiction over the operating, mechanical and purchasing departments, succeeding Mr. William Gerig, resigned.

Mr. Lawrence K. Langdon, of Warren County, Ohio, was appointed a member of the Ohio Public Utilities Commission on May 27 to succeed Mr. Charles C. Marshall, resigned. Mr. Langdon was a member of the seventy-eighth and seventy-ninth General Assemblies. During the latter session, in 1911, he virtually prepared the original public utilities law. When Governor Willis assumed the reins last fall, Mr. Langdon was appointed counsel for the commission. His term as member of the commission will expire on Feb. 1, 1917.

Mr. L. O. Veser has been appointed electrical superintendent of the works of the Aluminum Company of America at Massena, N. Y. Mr. Vesser is a graduate of Cornell University and until recently was electrical engineer for the Northern Ohio Traction & Light Company, Akron, Ohio. He had for a number of years been associated with the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, in the capacity of superintendent of construction and chief engineer, and was also with the West Penn Traction Company as assistant superintendent of transmission.

Mr. Herbert L. Harries has become general manager of the Washington-Oregon Corporation, with headquarters at Vancouver, Wash. He was until recently assistant operating superintendent of the Central Hudson Gas & Electric Company, Poughkeepsie, N. Y., having been theretofore assistant general manager of the Louisville Gas & Electric Company, Louisville, Ky., of which his father, Gen. George H. Harries, is president. Like his father, Mr. Harries was enrolled at West Point. He is a first lieutenant in the ordnance department of the District of Columbia militia under presidential appointment.

Mr. Francis H. Dewey, president of the Worcester (Mass.) Consolidated Street Railway, has been elected president of the New England Investment & Security Company to succeed Mr. J. T. Harmer, resigned. Mr. Dewey was born at Worcester, Mass., on March 23, 1856, and was graduated from Williams College in 1876 with a degree of A. B. In 1879 Williams College conferred upon him the degree of A. M. Meanwhile, in 1878, he received from Harvard the degree LL.B. He has been solicitor and a trustee of the Worcester Mechanics' Savings Bank and the Mechanics' National Bank since 1880. He has been president of the Mechanics' National Bank since 1888, of the Worcester Consolidated Street Railway since 1898, and is also vice-president of three other street railway companies. He is a director of the Norwich & Worcester Railroad, the Worcester Gas Light Company, Massachusetts Bonding & Insurance Company and the New England Telephone & Telegraph Company. He is president and treasurer of the Bay State House, a trustee and vice-president of the Worcester Railways & Investment Company and an officer of other corporations. He is a trustee, vice-president and treasurer of Clark University and Clark College, vice-president of the Worcester Art Museum, a director of the associated charities of Worcester, chairman of the commission for city hospital funds of Worcester, a trustee of the Memorial Hospital at Worcester, and a member of the Worcester County Bar Association.

Mr. Clark V. Wood, vice-president of the Springfield (Mass.) Street Railway, has been elected president of the company to succeed Mr. J. T. Harmer, resigned. Mr. Wood has also been elected a vice-president of several small roads in the Springfield system, these including the Milford, Attleboro & Woonsocket Street Railway, the Attleboro Branch Railroad and the Webster & Dudley Street Railway. Mr. Wood was born in Woodstock, Vt., on June 8, 1863. He was graduated from the Woodstock High School with the class of 1881 and at once entered the service of the Grand Trunk Railway as a telegraph operator. After serving on the Grand Trunk at various points between Montreal, Can., and Portland, Maine, he took a more important position with the Boston & Maine Railroad as agent and then shifted to the New York & New England Railroad. He worked with this railroad, now a part of the New York, New Haven & Hartford, first as freight cashier and later as agent at Providence, R. I. The Pittsburgh & Lake Erie Railroad offered Mr. Wood its general passenger agency, and he went to Pittsburgh and made his office there during his period as passenger agent. He was later appointed private secretary to Mr. J. G. Odell, the vice-president of the road, and next became superintendent of the West Side Belt Railroad and the Pittsburgh Terminal Railway & Coal Company. Later he accepted the superintendency of the Wabash Railroad with supervision over the operation of the whole system consisting of more than 400 miles of track and coal and iron ore docks at Cleveland and Toledo. In 1900 at the request of Judge James H. Reed, president of the Philadelphia Company, Mr. Wood assumed the task of developing freight traffic on the lines of the Pittsburgh Railways. This Mr. Wood showed remarkable ability in doing. Having completed this work satisfactorily he resigned from the Wabash System, which he had temporarily left, and became connected with the electric railways in Springfield, Mass., then under the control of the New York, New Haven & Hartford Railroad. In 1906 Mr. Wood assumed charge at Boston of all traffic on the lines owned and controlled by the New England Investment & Security Company. His success in the operating department led the directors to create a new office for him, and Nov. 1, 1913, he was made vice-president in charge of the operating and traffic departments of the Worcester (Mass.) Consolidated Street Railway, Springfield Street Railway, Milford, Attleboro & Woonsocket Street Railway, Interstate Consolidated Street Railway and the Attleboro Branch Railroad. In this position he took over part of the work done previously by President J. T. Harmer, who has just resigned.

CLARK V. WOOD

OBITUARY

Thomas Green, superintendent of transportation of the South Covington & Cincinnati Street Railway, Covington, Ky., is dead at his home here after an illness of several months of dropsy. Mr. Green had been in the employ of the company for twenty-eight years, rising from the post of driver of a horse car to motorman, inspector and finally superintendent.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

FRANCHISES

Bangor, Maine.—The Bangor Railway & Electric Company has received a franchise from the Council to double-track its line on Union Street, Bangor, for a distance of about 1200 ft.

Baltimore, Md.—Application will be made to the Council by the United Railways & Electric Company for a franchise to divert its Mount Washington line from Calvert Street to Charles Street between Center Street and German Street, Baltimore.

East Boston, Mass.—The Bay State Street Railway has asked the Council for a franchise to alter its tracks on Walley Street, East Boston, from Gladstone Street to Waldemar Avenue.

Kansas City, Mo.—The Metropolitan Street Railway has received franchises to lay a single track on Prospect Avenue from Forty-seventh Street to Seventy-second Street and to make the following extensions in Kansas City: Thirty-first Street south of Indiana Street; Twenty-fourth Street from Hardesty Street to Brighton Street; Twelfth Street east from Winchester Avenue and Broadway from Twenty-fourth Street to Southwest Boulevard.

Buffalo, N. Y.—The International Railway has asked the Council for a franchise to double-track its line on West Ferry Street and to extend this line through Gelston Street to a junction with Niagara Street, Buffalo. The company has also asked for a franchise to build a line on Michigan Street from Elk Street to Ohio Street and westerly along Ohio Street.

North Columbus, Ohio.—The East Linden Traction Company has asked the Council for permission to present a request for a franchise to build a cross-town line in North Columbus. The proposed route will be west on Hudson Street from Atcheson Pike to Neil Avenue, north to Dodridge Street and west to the east bank of the Olentangy River. Philip B. Gaynor, New York, president. [April 17, '15.]

TRACK AND ROADWAY

Fort Smith Light & Traction Company, Fort Smith, Ark.—New rails have been delivered along North Thirteenth Street, Ft. Smith, for use on that division. The double-track construction on the Electric Park Division is about completed.

British Columbia Electric Railway, Vancouver, B. C.—The Town Council of South Vancouver has offered to pave the center strip and to lay the tracks on Victoria Road and the unfinished portion of the line on Main Street.

Fresno, Coalinga & Monterey Railway, Fresno, Cal.—This company reports that on account of financial conditions it has not been decided when construction will be begun on its line between Fresno and Monterey. A construction company is being organized to build and equip the entire road. Ernest R. Shaw, 704 Mutual Bank Building, San Francisco, general manager.

Pacific Electric Railway, Los Angeles, Cal.—Plans are being made by this company to spend at once $75,000 in improving its double track on American Avenue from Anaheim Street to Sixth Street, Long Beach, 3 miles. The improvement will consist of laying 127-lb. grooved or Trilby rails, paving between and at the sides of the rails from Anaheim Street to Sixth Street, reballasting the entire roadbed and repaving other portions of the street where necessary. The company has recently made improvements in Long Beach amounting to $25,000.

Municipal Railways of San Francisco, San Francisco, Cal.—Plans are being considered by the Public Utilities Committee of the Supervisors for an extension across Golden Gate Park, San Francisco. The proposed line is to extend from Tenth Avenue and Fulton Street through Golden Gate Park to Fourteenth Avenue and Lincoln Way. Its terminus will be at Fourteenth Avenue and Judah Street. The roadway through Golden Gate Park will be depressed.

Norwalk & New Canaan Street Railway, Norwalk, Conn.—This company reports that owing to financial conditions construction has not been begun on its proposed line between Norwalk and New Canaan, 7 miles. The charter has been renewed by the Legislature of 1915 and efforts will be made to have the road built. James T. Hubbard, Norwalk, is interested.—[Aug. 15, '14.]

Alton, Granite & St. Louis Traction Company, Alton, Ill.—Preliminary arrangements are being made by this company to build an overhead crossing at the Chicago, Burlington & Quincy Railroad tracks and a subgrade crossing under the Chicago & Alton Railroad tracks so that the electric line may be extended to the site of the proposed hospital, 1 mile east of Upper Alton.

Southern Traction Company of Illinois, East St. Louis, Ill.—Plans are being made by this company to resume construction on its line across the municipal bridge. The company proposes to operate an electric line through the coal fields of Illinois to Du Quoin, passing through several important cities. The line between East St. Louis and Belleville is almost completed.

Aurora, Plainfield & Joliet Railway, Joliet, Ill.—Plans are being considered by this company to double-track its line on North Chicago Street between Webster Street and Ruby Street, Joliet.

Murphysboro & Southern Illinois Railway, Murphysboro, Ill.—Plans are being made to begin at once the construction of this company's 8-mile line between Murphysboro and Carbondale. A. B. Minton, Murphysboro, president. [Feb. 27, '15.]

Gary, Hobart & Eastern Traction Company, Hobart, Ind.—Plans are being made by this company to extend its line in Gary from Broadway east to Virginia Street and north to the mill gates.

***Vincennes, Ind.**—Plans are being considered to build a railway from Bicknell, via Bruceville and Aliceville, to Vincennes. John T. Oliphant, Vincennes, is interested.

Keokuk-Jefferson City Electric Railway, Keokuk, Ia.—Surveys have been made of this company's line from Keokuk to Newark. It is proposed to build an electric railway between Keokuk, Ia., and Jefferson City, Mo., via Wayland, Williamtown, Labell, Newark, Bethel, Shelbyville, Shelbina, Paris, Mexico and Fulton. H. W. Knight, Chicago, is interested. [March 6, '15.]

Mexico Investment & Construction Company, Mexico, Mo.—Plans are being made by this company to begin construction on its Molino-Sante Fe division about June 10. It is proposed to extend the line 14 miles southwest of Mexico if a bonus of $30,000 can be secured from the citizens.

Trenton & Mercer County Traction Corporation, Trenton, N. J.—The Colonial Civics Club of Trenton is circulating petitions to the effect that an extension of this company's line on Hamilton Avenue and Olden Avenue be made to the Municipal Hospital.

Brooklyn, N. Y.—The Public Service Commission for the First District of New York has awarded the contract for the construction of section No. 2 of Route No. 49 to Oscar Daniels Company for $863,775. This section is a part of the Culver rapid transit railroad in Brooklyn, which will connect with the Fourth Avenue subway. The route runs through Gravesend Avenue and Shell Road to Coney Island. The part just placed under contract extends from Bay Parkway (Twenty-second Avenue) through Gravesend Avenue and Shell Road to Avenue X. The road will be an elevated line, and the contractor must complete it within 18 months. The new road will be operated by the New York Municipal Railway Corporation in connection with the Fourth Avenue subway.

International Railway, Buffalo, N. Y.—This company will double-track its line on Virgil Avenue from Hertel Avenue to Kenmore Avenue, Buffalo.

Wallkill Transit Company, Middletown, N. Y.—This company is considering plans to extend its line to connect with the Orange County Traction Company's line at Walden. Surveys have been made of the proposed extension.

Northern Ohio Traction & Light Company, Akron, Ohio.—This company has recently purchased from the Algoma Steel Company of Canada 500 tons of steel rails.

***Custaloga, Ohio.**—Plans are being considered to build an electric railway from Custaloga to Big Prairie, 1½ miles. John C. Lake, Big Prairie, is interested.

***Bristow, Okla.**—Surveys have been begun by St. Louis capitalists for a railway to be built from Bristow to Drumright and from Bristow to Okmulgee. W. Mathews, St. Louis, is among those in charge of the engineering work.

Berlin, Ont.—Ex-Mayor W. D. Euler, Berlin, district vice-president of the Ontario Hydro-radial Union, has sent to the municipal councils of the cities of Berlin and Guelf and the townships of Waterloo and Guelf resolutions for endorsement, requesting that the hydro-electric commission make a survey for a hydro-radial railway from Berlin, via Bridgeport, Bloomingdale and New Germany, to Guelf.

Sudbury-Copper Cliff Suburban Electric Railway, Sudbury, Ont.—Plans are being made by this company to resume construction this month on its line between Sudbury and Copper Cliff. All of the grading has been completed, most of the ties placed and some track laid. J. H. Mackey, Sudbury, president. [Dec. 19, '14.]

Toronto (Ont.) Suburban Street Railway.—Track has been laid on this company's line from Islington almost to the west bank of the Humber River and a temporary bridge erected over Mimico Creek. The piers and abutments for the bridge across the Humber River are practically completed and it is expected that the material for its construction will be delivered soon. Ballasting has been begun along the line to Georgetown and tracklaying has been begun west of Georgetown.

Portland, Eugene & Eastern Railway, Portland, Ore.—This company plans to spend $15,000 this summer on improvements to its line.

***Huntingdon, Pa.**—Plans are being considered to build an electric or steam railway between Huntingdon and McAlevys Fort. H. G. Tussey, McAlevys Fort, is interested.

Conestoga Traction Company, Lancaster, Pa.—At a recent meeting of the Lancaster Chamber of Commerce announcement was made that within the next few weeks work will be begun on a $300,000 underground conduit system to be used exclusively for the wires of this company and the Edison Electric Light Company.

***Milford, Pa.**—Residents of Milford are making a united effort to secure a railway from Milford to Port Jervis, N. Y. The Business Men's League of Milford have received a proposition for the town to pay a part of the cost of the improvement. Solicitors of Milford are now canvassing for the money.

Phoenixville, Valley Forge & Strafford Electric Railway, Phoenixville, Pa.—Plans are under consideration by this company to extend its lines into Montgomery County from Phoenixville.

Reading (Pa.) Transit Company.—During this year this company plans to expend $180,000 in Reading for track renewals and paving. About $100,000 will also be spent on improvements at Lebanon and other places along the company's lines.

West Chester (Pa.) Street Railway.—New ties are being laid by this company and its overhead system renewed in West Chester.

Quebec Railway, Light, Heat & Power Company, Quebec, Que.—A by-law to compel this company to extend its lines to St. Malo and Belvedere Wards will shortly be voted on.

Three Rivers (Que.) Traction Company.—Construction has been begun on this company's line in Three Rivers and the suburban extension to Cap de la Madeleine, 7 miles. It is expected that the line will be completed by Sept. 1. T. McDougall, president. [Mar. 20, '15.]

Regina (Sask.) Municipal Railway.—The Council of Regina has authorized the expenditure of $10,000 to build an extension of the Young Street line to connect the new power house in Regina with the Canadian Pacific Railroad line.

Savannah, Piedmont & Western Railway, Columbia, S. C.—Financial arrangements are being completed for the construction of this company's line between Greenwood and Augusta, 60 miles. Preliminary surveys have been made and rights-of-way obtained for practically the entire line. J. Peyton Clark, 43 Cedar Street, New York, is interested. [April 3, '15.]

Carolina, Greeneville & Northern Railroad, Greeneville, Tenn.—Plans are under consideration by this company to extend its line from Kingsport to Bristol, 25 miles, and from Newport to Knoxville, 40 miles. The proposed main line is from Kingsport via Greeneville to Newport, 75 miles. This would make the entire line 140 miles. It is expected that construction will be begun soon. H. S. Reed, 205 Grant Building, Los Angeles, Cal., president.

San Antonio & Austin Interurban Railway, San Antonio, Tex.—Plans are being made to resume construction on this proposed line between San Antonio and Austin. About 60 per cent of the right-of-way has been obtained and it is expected that it will be possible to begin work late in the summer or early in the fall. V. P. Brown, San Antonio, is interested. [April 3, '15.]

Ogden, Logan & Idaho Railway, Ogden, Utah.—Grading has been begun and track laid on this company's extension to Huntsville.

Gray's Harbor Railway & Light Company, Aberdeen, Wash.—An extension of its North Hoquiam branch from the present terminus at the Lytle Mill to the Little Hoquiam Bridge, 1 mile, is being considered by this company. The franchise for the right-of-way was granted the company some time ago.

Walla Walla (Wash.) Valley Railway.—This company is reconstructing some of its track in Walla Walla. The rails are 72 lb., and the ties and rails are being laid in concrete.

Princeton (W. Va.) Power Company.—The construction of track has been begun on this company's line from Princeton to Bluefield, 12 miles, and the work will be steadily continued to completion.

Southern Wisconsin Railway, Madison, Wis.—In connection with improvements which the city is expecting to make before Nov. 1, 1915, this company plans to reconstruct and pave its roadbed between Park Street and Mills Street and to pave the roadbed on Williamson Street between Blair Street and Jenifer Street.

SHOPS AND BUILDINGS

Shore Line Electric Railway, Norwich, Conn.—This company expects to build a new carhouse on Montauk Avenue, New London. The structure will be 75 ft. x 220 ft., one story with basement. The trim will be limestone, granite and terra cotta and the sashes and doors will be steel. The floors will be reinforced concrete. The structure will eventually replace the present wooden carhouse, but the initial construction will be that of a building at the south of the present carhouse. Plans for the new carhouse will be ready in the office of Cudworth, Woodworth & Thompson, Norwich, in about two weeks.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—Fire early on the morning of May 19 destroyed the carhouse of this company at Twenty-sixth Street and Kossuth Street, Lafayette, as well as eight closed cars, five summer cars, a snow sweeper, a sand car and the $10,000 electric brake test car "Louise." The loss is estimated at $75,000.

Boston (Mass.) Elevated Railway.—Plans have been completed by this company for the erection of a concrete and steel transfer station at Lake Street, Chestnut Hill, to be placed in service by the fall of 1916. The station will supersede an umbrella-type open-air station at the junction of the Boston Elevated Railway and Middlesex & Boston Street Railway. The new installation will include platforms at two levels, with loops and inclines providing for the separation of in-bound and out-bound traffic, with quick transfer between parallel lines. The new station will do away with the present shelters and eliminate two of the four tracks now in service. The cost is estimated to be $60,000.

Worcester (Mass.) Consolidated Street Railway.—This company has completed its freight and trolley express station at Adams Street, Leominster. Connecting tracks from the Union Street branch of the cross-town line have been laid.

Toronto (Ont.) Civil Railway.—A temporary carhouse has been built by this company on its Bloor Street line between Dorval Road and Indian Road to accommodate the cars now operating on that line. It is a frame structure, 85 ft by 21 ft. with a pit track.

Manufactures and Supplies

ROLLING STOCK

Toronto (Ont.) Civic Railway will receive tenders up to June 8 for four city cars for its Lansdowne Avenue extension.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., at a recent fire which destroyed its car barns, lost eight closed cars, five summer cars, a snow sweeper, a sand car and an elaborately equipped electric brake test car. It is reported that the cars will be replaced at once.

TRADE NOTES

Sangamo Electric Company, Springfield, Ill., has removed its office at Rochester, N. Y., to the Mercantile Building.

Ohio Brass Company, Mansfield, Ohio, has received an order for Tomlinson M. C. B. couplers for ten cars of the Wilkes-Barre & Hazleton Railway and automatic air couplers for ten cars of the Lehigh Valley Traction Company.

Esterline Company, Indianapolis, Ind., manufacturer of "Golden Glow" headlights, has received an order from the Pressed Steel Car Company for thirty SR-95 headlights for the new cars of the New York, Westchester & Boston Railway.

Pyrene Manufacturing Company, New York, N. Y., is reciprocating with the automobile trade by motorizing its sales department. The company recently bought six Ford automobiles, which are in use in several different branch offices and which will be used entirely by salesmen and not for deliveries. Each automobile will be equipped with a Pyrene fire extinguisher.

Ohmer Fare Register Company, Dayton, Ohio, on May 20 held its twenty-fourth semi-annual distribution of prizes to the employees in the company who had made the best suggestions during the past six months for improvements in fare registers, for more efficient practices of manufacture or for the betterment of the employees and the business in general. After a talk by the president, John F. Ohmer, eighteen men received cash prizes for their suggestions.

Standard Railway Supply Company, Cincinnati, Ohio, has purchased the manufacture, sale and ownership of the "Kisinger (K-I)" patented splicing sleeve from the Standard Pulley Company of Cincinnati. This sleeve is made in various lengths and for all types of trolley wires and cables, and with it an effective and permanent splice can be easily and quickly made, requiring only the insertion of two small tempered steel wedges into the sleeve. No soldering is necessary. John D. Berger is manager of the Standard Railway Supply Company.

Sanderson & Porter, New York, N. Y., report that the first four sections, comprising about 47 miles, of the oil pipe line for the Valley Pipe Line Company, a subsidiary of the Shell Royal Dutch Company, which was designed and is being built by Sanderson & Porter, was placed in successful operation on May 15. This line is 170 miles long, extends from the Coalinga oil fields to a tidewater terminal near Martinez in San Francisco Bay, and will have a carrying capacity of 25,000 barrels per day. In order to comply with the wishes of the Shell Company for prompt completion, the constructing engineers, Messrs. Sanderson & Porter, have pushed this work through in what is believed to be record time.

ADVERTISING LITERATURE

Walter A. Zelnicker Supply Company, St. Louis, Mo., has issued a folder on its tank-car tanks.

Pressed Asbestos Products Company, New York, has issued a catalog describing its Papco products for various uses as an electrical dielectric and heat-resisting material.

Trolley Supply Company, Canton, Ohio, has issued two folders, one on the McLain No. 25 extended dash headlight and the other on the Simplex roller-bearing trolley base No. 3.

Chicago Pneumatic Tool Company, Chicago, Ill., has issued Bulletin No. 34-U, which contains instructions for controlling and operating its class N-SO fuel-oil-driven compressors.

Robert W. Adams, Providence, R. I., has issued a folder describing the new "Engineers' Edition" of his transmission line calculator for determining voltage drop and power loss in a.c. circuits.

Westinghouse Traction Brake Company, New York, N. Y., has received an order for air-brake equipment with emergency feature for the two trailer and two motor cars recently ordered by the Alabama Power Company from the Southern Car Company.

Ohmer Fare Register Company, Dayton, Ohio, has issued a card on its fare registers. The card announces an order from the Albany Southern Railway to equip its entire system with fare registers of this company as a result of satisfactory trial service.

Trussed Concrete Steel Company, Detroit, Mich., has issued a catalog illustrating the Kahn Pressed Steel type of building construction for industrial plants. In floors these pressed steel beams eliminate inflammable wood joints, giving a permanent construction of great strength. Upon these beams which are placed 23½ in. on centers, is laid ⅜ in. Hy-Rib and concrete applied. Where wood floor is desired wood sleepers are attached to the pressed-steel beams by nailing between the channels. For the ceiling under the beams the ⅜-in lath is readily attached by means of prongs on the underside of the beams.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued two switchboard publications, DS 1439 and 1456, which give unusually complete information on this subject, the former covering a.c. switchboards with hand-operated switchboard-mounting oil circuit breakers, and the latter rotary-converter panels. Complete detailed information is given on these types of boards, including a number of diagrams, and suggestions as to the best method of assembly. Another publication has been issued by this company entitled "The Relation of Trolley Feeder Taps to Machine Flash-Overs," which is a reprint of an article which recently appeared in the ELECTRIC RAILWAY JOURNAL. This article discusses the above-mentioned subject, giving the reason for the application of the tap and the various conditions affecting the flash-over, quoting numerous instances where rotary converters had flashed over.

General Electric Company, Schenectady, N. Y., has issued Bulletin No. 41,013, giving a detailed description of its type RC d.c. commutating-pole motors. These motors are built with a frame of cast steel of medium weight with symmetrical section. They can be used with a sliding base which maintains a correct driving alignment, and which, with the adjustable shields, permits the installation of the motor on either the floor, wall or ceiling. As these motors may be equipped with covers rendering them semi-enclosed, totally-inclosed, or self-ventilated, they are wound for 115, 230 and 550 volts d.c. circuits, with permissible voltage range of 110 to 125, 220 to 250 and 500 to 600 volts. Bulletin No. 44,406 describes and contains characteristic curves of the GE-247 ventilated commutating-pole railway motor, for city service. By the adoption of the box type of frame and a specially effective system of ventilation and by the use of pressed steel for certain parts, it has been made sufficiently light in weight for use in light cars without any sacrifice of strength or reliability. This motor has hourly rating of 35 hp on 600 volts and 30 hp on 500 volts.

The Northwestern Elevated Railroad, Chicago, Ill., has recently issued a booklet which contains an illustrated description of its line and the character and extent of its service. An interesting comparison is made of the urban and suburban transportation problems of Chicago with those of other large cities. New York, London, Paris, Boston, it is shown, are cities which have in a measure become set along certain lines, making the providing of transportation a determinable problem. Chicago, however, has been free to grow in all directions save one. With this enormous and rapid growth in a territory which offered no impediments, the open prairie of Illinois, there has always been "plenty of room to spread out." The transportation problem has, therefore, been to serve an urban population only slightly less than that of Manhattan Island, but occupying a very much larger area.

We are exclusive eastern sales agents for the following Companies. When you are in the market for equipment manufactured by any of these concerns, send us your inquiries and we can assure you they shall receive prompt and careful attention.

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Cincinnati, Ohio
City and Suburban Cars, Wood and All-Steel

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THE ALBANY CAR WHEEL COMPANY
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Wilmington, Delaware, June 5, 1915.

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The I. C. L. Company also manufactures 25-to-50-ton passenger and freight locomotives; speeds ranging to 60 miles per hour.

Look us up, please Sir.

INTERNAL COMBUSTION LOCOMOTIVE COMPANY
Per J. W. McKay, Genl. Mgr.

Equitable Building

200 Lineal Feet of Concrete 9′ x 13″ Removed in 5 hours

The photo illustrates removal of concrete track foundation in Cincinnati. Altho' the work was handicapped by one minute car service from 7:00 until 9:30 and by the fact there were not sufficient wagons to keep the shovel working steady, the following progress was made—the shovel breaking the bond of the concrete and loading it into the wagons.

Actual working time, including intermissions	5 hrs.
Lineal feet excavated	200
Width of cut	9′
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Crew employed, 1 operator, 1 foreman and 4 laborers.

Booklet "F" is a special electric railway bulletin

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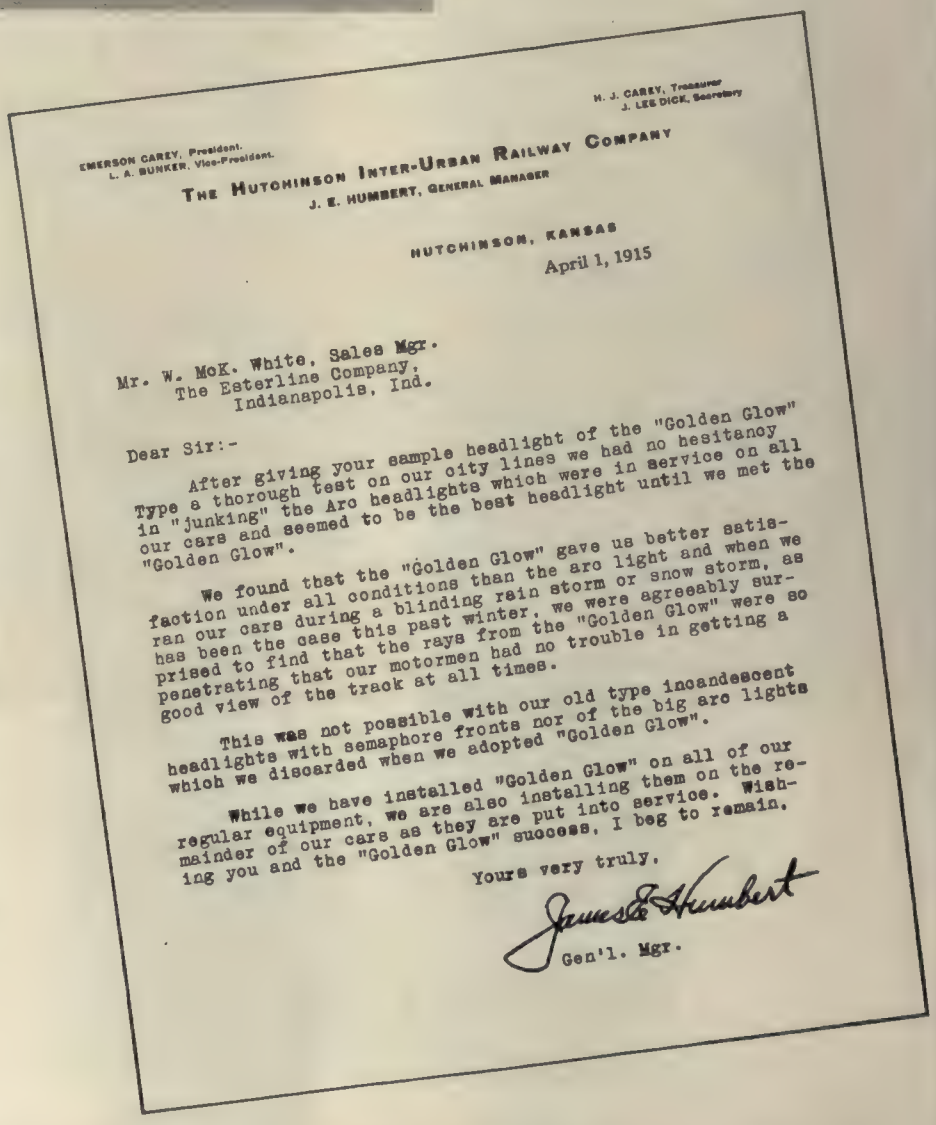
Operating officials on 184 other progressive electric and steam railroads have had the same experience with these "Safety Illumination" headlights.

We do not hesitate to name the companies using "Golden Glow" equipment because they are the biggest and livest properties in every State and are "Golden Glow" boosters.

They, too, have discarded inefficient apparatus because it pays them to have the best headlights (and the best brakes) available.

The usual cost of a single accident is greater than a complete "Golden Glow" installation and no car so equipped has ever had an accident due to lack of light.



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J. E. HUMBERT, GENERAL MANAGER

HUTCHINSON, KANSAS
April 1, 1915

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The Esterline Company,
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Dear Sir:-

After giving your sample headlight of the "Golden Glow" Type a thorough test on our city lines we had no hesitancy in "junking" the Arc headlights which were in service on all our cars and seemed to be the best headlight until we met the "Golden Glow".

We found that the "Golden Glow" gave us better satisfaction under all conditions than the arc light and when we ran our cars during a blinding rain storm or snow storm, as has been the case this past winter, we were agreeably surprised to find that the rays from the "Golden Glow" were so penetrating that our motormen had no trouble in getting a good view of the track at all times.

This was not possible with our old type incandescent headlights with semaphore fronts nor of the big arc lights which we discarded when we adopted "Golden Glow".

While we have installed "Golden Glow" on all of our regular equipment, we are also installing them on the remainder of our cars as they are put into service. Wishing you and the "Golden Glow" success, I beg to remain,

Yours very truly,

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Gen'l. Mgr.

Important—A new "Golden Glow" headlight catalogue is now on the press. It will be sent out only on request and not by general circularization, but a postal or a note will bring it to you. Complete description of steam and electric railway lamps, marine and industrial lighting equipment.

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Its small cost puts it within reach of your company for every one of your cars. If you wish, we will build them to meet your especial needs.

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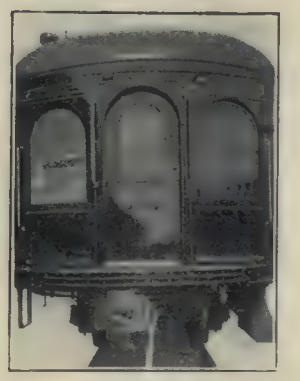
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When the majority of large and small roads in every section of the country adopt an appliance as a part of standard car equipment—then its use can be rightly termed *Standard Practice.*

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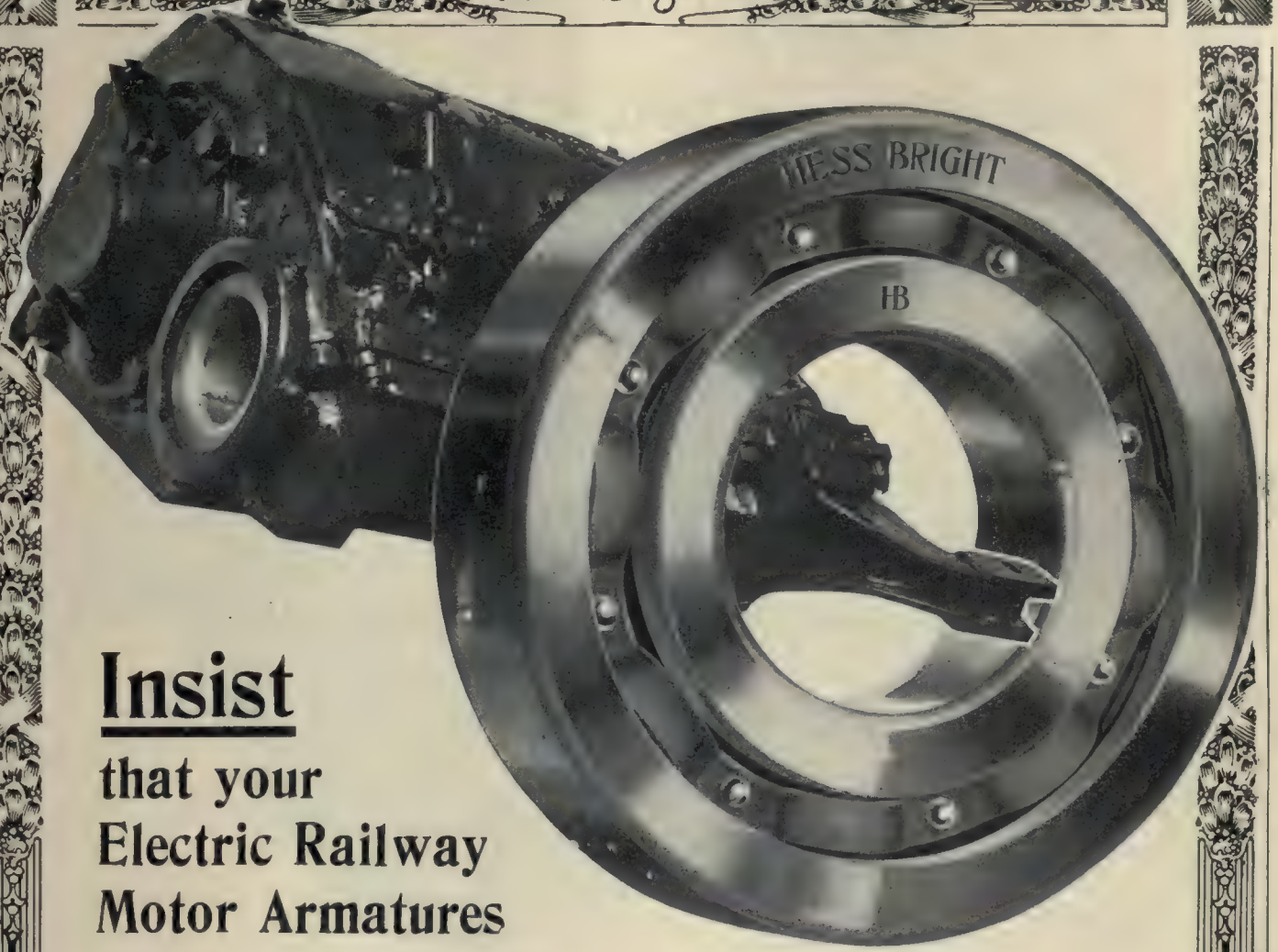

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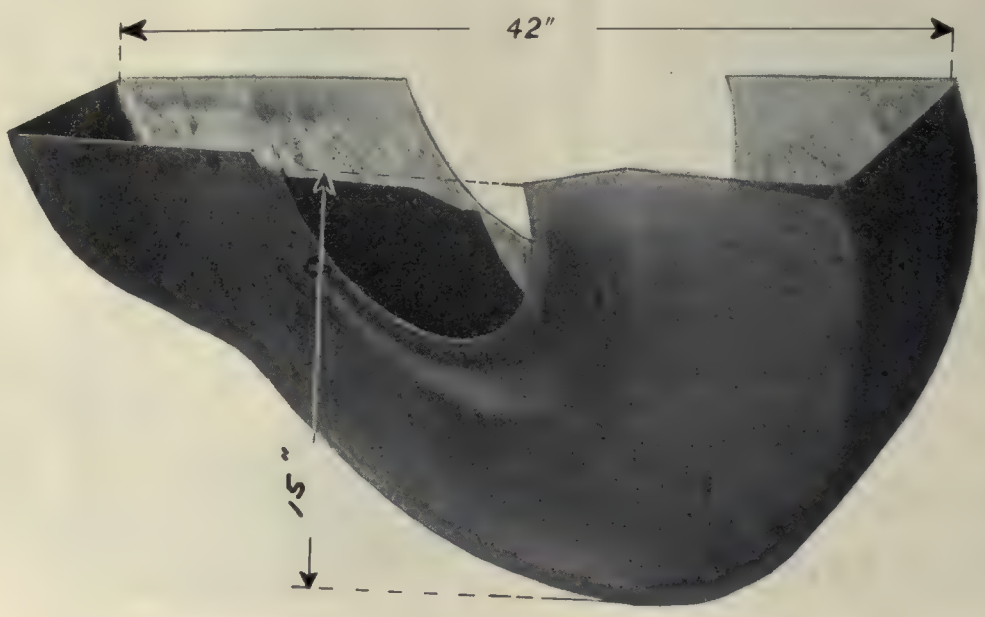
The Pennsylvania Railroad

will soon operate on its main line electric passenger cars equipped with the largest drawn steel gear cases ever built. One-half of this Chillingworth case is illustrated in the cut shown.



The Chillingworth Patented Process

used in our Jersey City Plant, where these cases were manufactured, will produce even larger cases than this. It absolutely guarantees uniformity of metal thickness and gives minimum weight with maximum efficiency. No other method insures these results. A malleable iron gear case of this size would be extremely heavy and expensive, hence the economy of Chillingworth Drawn Steel Gear Cases.

See one of these cases at the A. R. M. M. and M. C. B. Conventions, Atlantic City, N. J.; our representative* Booth No. 622.

THAYER & COMPANY, INC., AGENTS

111 Broadway, New York City

REPRESENTATIVES:

*U. S. Metal and Mfg. Co., Southern and New England States.
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NO-SPARK
Carbon Brushes

These brushes will not spark, heat, cut, chip or break while operating under the severe conditions of a varying load, and will not absorb moisture.

These qualities will eliminate commutator troubles sufficiently to pay your brush bills several times over.

A trial order will convince you.

Fill Out This Coupon and Mail Today

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CALEBAUGH SELF-LUBRICATING CARBON CO., INC.
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Gentlemen: Please ship me carbons as per order enclosed, on 60 or 90 days' free trial. It is understood this does not imply an obligation to buy unless carbons are satisfactory.

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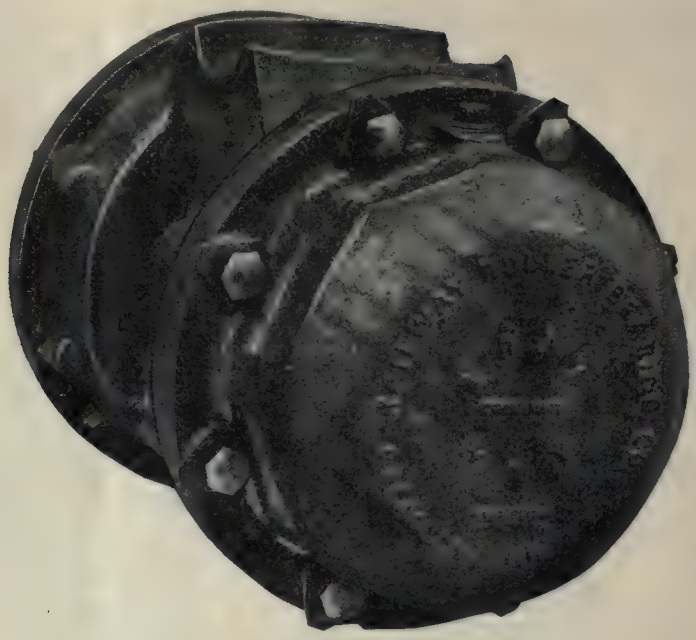
Making Good in New York



Rollway Bearings

For the past three years the Third Avenue Railway of New York has been operating thirty storage battery cars equipped with Rollway Bearings. They have been making a splendid record for low maintenance cost.

Rollway Bearings require *less lubricant* because they reduce friction and they are oil-tight and dust-proof.

They *reduce maintenance* cost. They have a fixed adjustment, thus requiring no adjustments.

They save fifteen per cent. of the total amount of power required to run the car.

We will gladly give you figures. *Write.*

The Railway Roller Bearing Co.

SYRACUSE, N. Y.

RELIABILITY - PERMANENCE - ECONOMY.
OKONITE
TRADE MARK
REG. U. S. PATENT OFFICE.

The STANDARD for RUBBER INSULATION

Railway Feed Wires insulated with OKONITE are unequalled for flexibility, durability, and efficiency, and are in use by the leading Electric Street Railway Companies. OKONITE is preferred above any other insulation for Car Wiring, Telegraph and Telephone Purposes.

OKONITE WIRES—OKONITE TAPE—MANSON TAPE—CANDEE WEATHERPROOF WIRES—CANDEE PATENTED POTHEADS.

Samples and Estimates on Application

THE OKONITE COMPANY, 253 Broadway, New York

CENTRAL ELECTRIC CO., Chicago, Ill., General Western Agents

F. D. Lawrence Electric Co., Cincinnati, O. Novelty Electric Co., Philadelphia, Pa. Pettingell-Andrews Co., Boston, Mass.

TROLLEY WIRE

Round Grooved and Figure 8

If you will agree that one make of trolley wire is able to give longer service than another make—

That one is more economical than another—

Then investigate our trolley wire with a view to cutting your wire costs.

STAR BRAND
Made to Wear To Wear Well
WEATHER-PROOF WIRE

Weatherproof Wires and Cables

Star Brand

Star Brand Wires are made with long service as the most prominent feature.

Because of their ability to render long service they cut wire costs.

Read the words in the cut of the star.

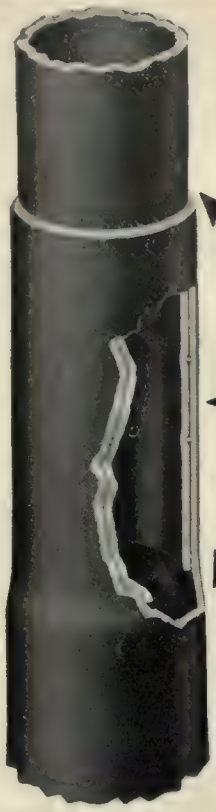
American Electrical Works

NEW YORK: 165 Broadway
CHICAGO: 112 West Adams Street
BOSTON: 176 Federal Street

Phillipsdale, R. I.

CINCINNATI: Traction Building
SAN FRANCISCO: 612 Howard Street
SEATTLE: 1002 First Avenue South

3105



Why Elreco Tubular Poles are Trouble-Proof

The Chamfered Joint prevents water accumulating at this point, obviating all tendency towards corrosion.

The "Wire-Lock" absolutely prevents telescoping of ELRECO poles at the joint.

Catalog No. 16 contains valuable information and recommendations of the A. E. R. A. for proper size poles for various conditions. Write for a copy.

Electric Railway Equipment Co.
Cincinnati, Ohio
NEW YORK: 30 CHURCH ST.

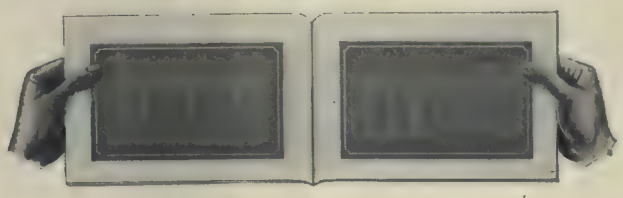
For Modern Car Equipment

PERRY Ventilators

Special and distinct designs for the three principal roof types—Raised Deck, Arch and Compromise Arch.

Perry Ventilator Co., **New Bedford, Mass.**
Sales Manager: F. C. Stowell, 200 Devonshire St., Boston, Mass.

How much will it cost to lay ORANGEBURG FIBRE CONDUIT?



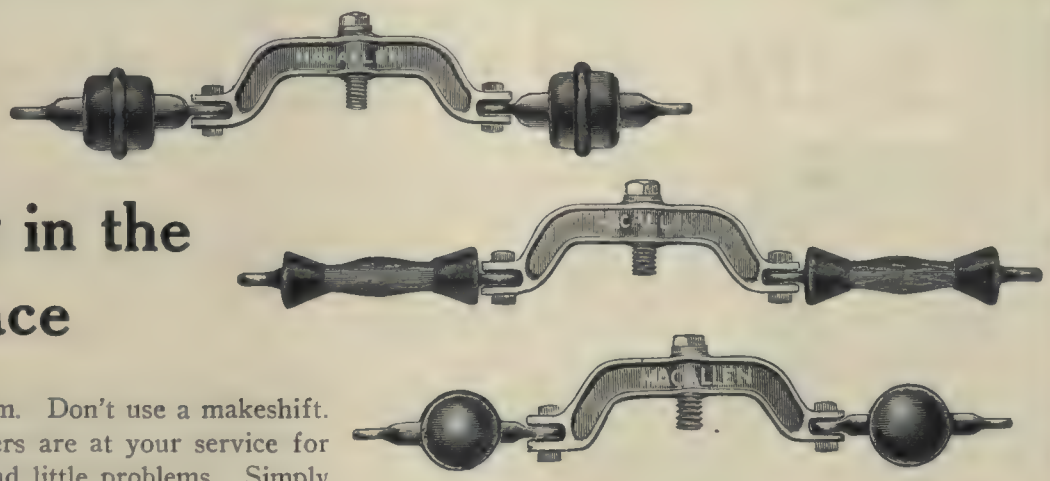
This Book tells

Contains sets of carefully prepared TABLES, covering the cost of every operation included in the installation of Orangeburg—Excavation, Concrete per trench foot, Mixtures, etc., etc. With this Book before you, you can not only learn all about Orangeburg Fibre Conduit, but you can figure out **exactly** how much its use will cost. A copy sent on request. Ask for Book R. Write to-day.

THE FIBRE CONDUIT COMPANY, ORANGEBURG, N. Y.

New York Boston Chicago San Francisco

The Right Pull-Over in the Right Place



is sometimes a problem. Don't use a makeshift. *Ask us.* Our engineers are at your service for the solution of big and little problems. Simply write us your requirements and we'll supply you with a device that will exactly fit the situation. We believe that there is a Macallen specialty for every overhead construction detail. If our line is not complete, *we want to know it.* If we haven't what you want, *we'll make it.* Put it up to us.

If you haven't our latest Catalog, write for it now

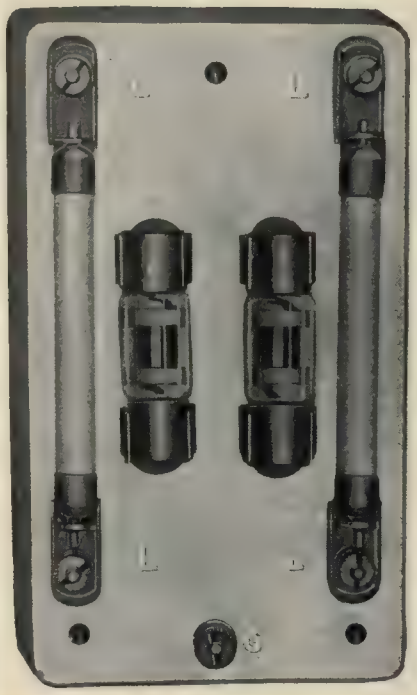
TRADE MACALLEN MARK.

The Macallen Company
Macallen and Foundry Sts., Boston

TRADE MACALLEN MARK.

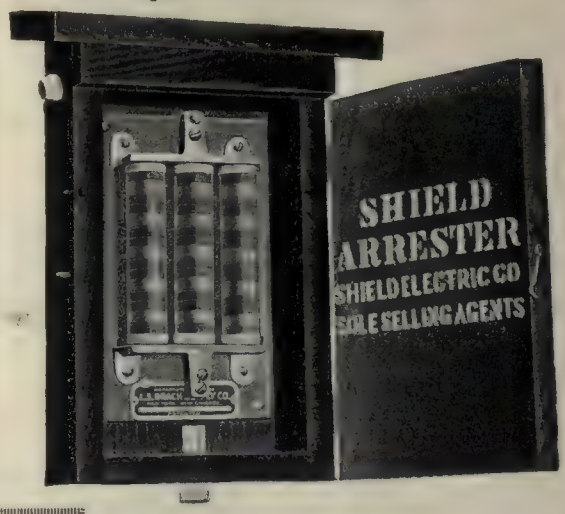
7239

Brach Vacuum Arresters
for
Telephone Protection



Sensitive to Induction.
Positive Protection from Crosses.
Admitted the Best for Lightning Discharges.
Clear Transmission is assured when these arresters are used.
Used everywhere by Electric and Steam Railways and Telephone companies.

Shield Drainage Arresters
600 Volts Service
No Liquids or Movable Parts



Drains static from your lines with high capacity for lightning discharges. No leaks or current losses. Arc Types—Pole Types made by manufacturers of Brach Automatic Flagman.

L. S. Brach Supply Co.
Main Office: 129 Sussex Ave., Newark, N. J.
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143 Liberty Street
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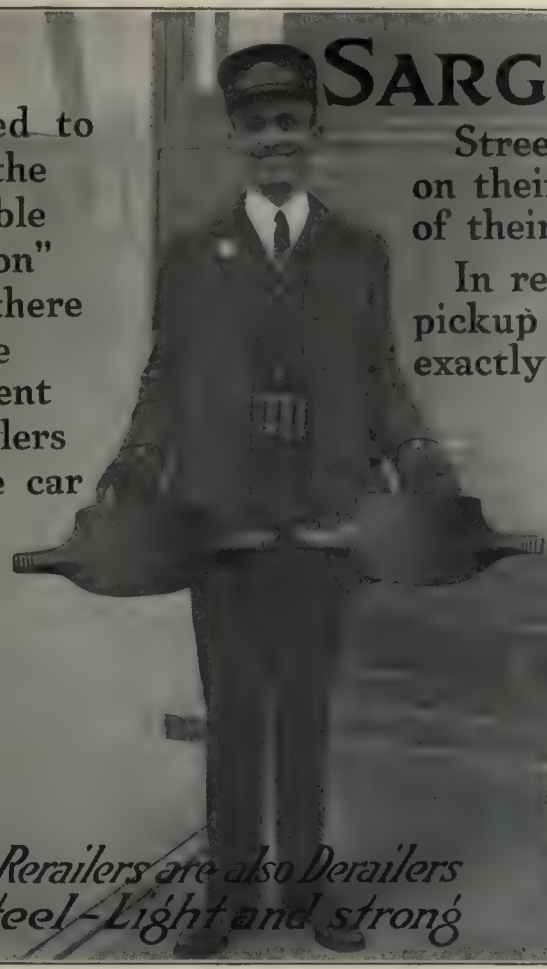
SARGENT CO. FISHER BLDG. CHICAGO

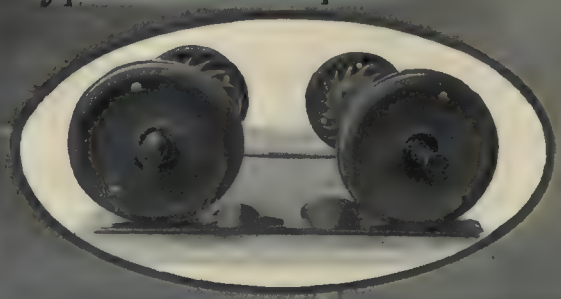
No need to call the "trouble wagon" when there are Sargent Rerailers on the car



Street car wheels off the track rest on their flanges with the broad surface of their treads raised.

In rerailing, the wheels roll onto the pickup ends of the Sargent Rerailers exactly as they roll on their treads on the rails.

Contrast the natural ease of this operation with the awkward performance of rolling wheels up on their flanges over the ordinary type of shell replacer.



Sargent Rerailers are also Derailers
Cast Steel—Light and strong

CAMBRIA

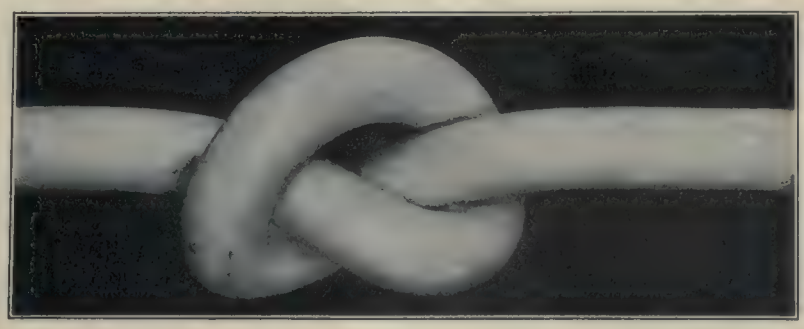
T-RAILS

Open Hearth and Bessemer
Track Bolts and Nuts

AXLES

Cambria Special

Rolled in the old way—the Cambria way. Slow reduction from ingot means maximum density and homogeneity.



Our axles represent the highest development in the art of heat treating. Axles for street and interurban lines, our Specialty.

CAMBRIA STEEL COMPANY

General Sales Office: Morris Bldg., PHILADELPHIA

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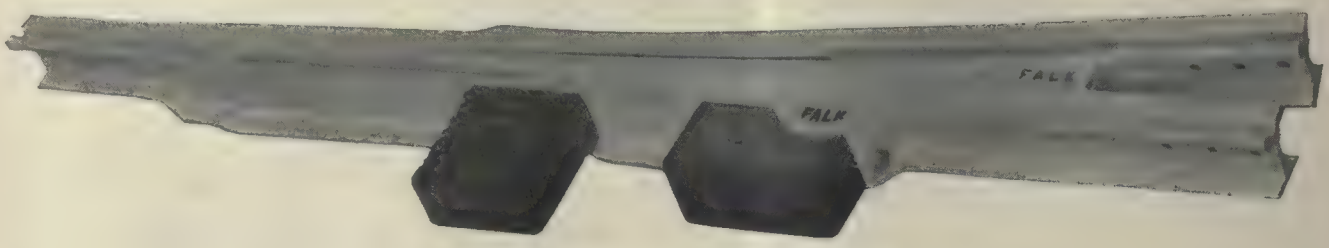
Works at Johnstown, Pa.

Falk Special Track Work

DOES REDUCE YOUR MAINTENANCE CHARGES



Solid Manganese Steel Switch

For Maximum Service

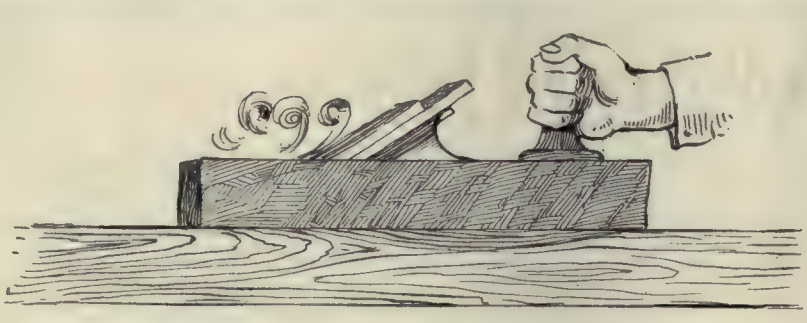
The Falk Company

Milwaukee

NEW YORK CITY—Wendell & MacDuffie Co.

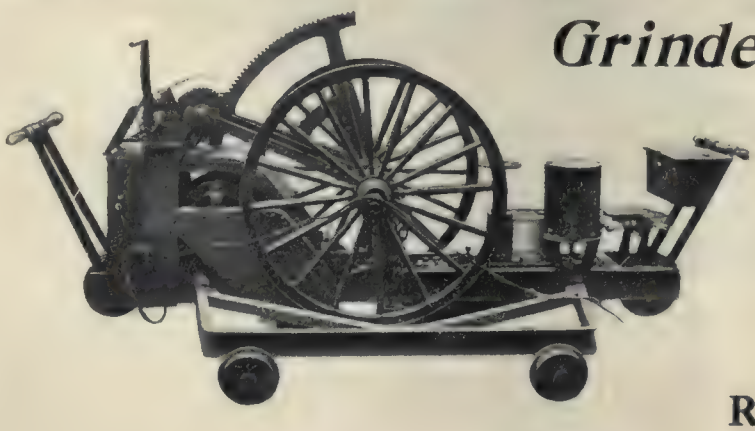
LOS ANGELES—Alphonso A. Wigmore

NEW ORLEANS—A. M. Lockett & Co.



The Planing Principle Applied to Rails

The Reciprocating Track Grinder



When you go out in the workshop to reduce a few high spots on a stubborn screen door do you take a draw-knife or a jack-plane?

If you want that screen door to fit, you take the plane.

The Reciprocating Grinder *planes* down the high spots in corrugated rail. *It wastes no metal.*

Write for the low-cost data.

Write for the Data

Railway Track-work Co.

Philadelphia

DOSSERT CONNECTORS

For Electric Railway Power and Sub-Stations

Did you ever have to make a quick change-over on your switchboard, transformer or brush-holder?

Ever any loose ends to connect?

Then you will appreciate what a ready-made joint would have meant to you.

DOSSERT LUGS provide these joints—no solder, no trouble. Just stick in the wire and tighten with a wrench.

Dossert Connectors, besides increasing efficiency and safety, save time and labor on installation costs. Used for connections to switchboards, busbars, switch and control gear, generator, converter and transformer apparatus, sectionalizing cases for signal installations, car wiring and all shop and mine wiring and apparatus.

Dossert Cable Tap

Familiarize Yourself with Dossert Service!

Ask for our Tenth Year Catalogue!

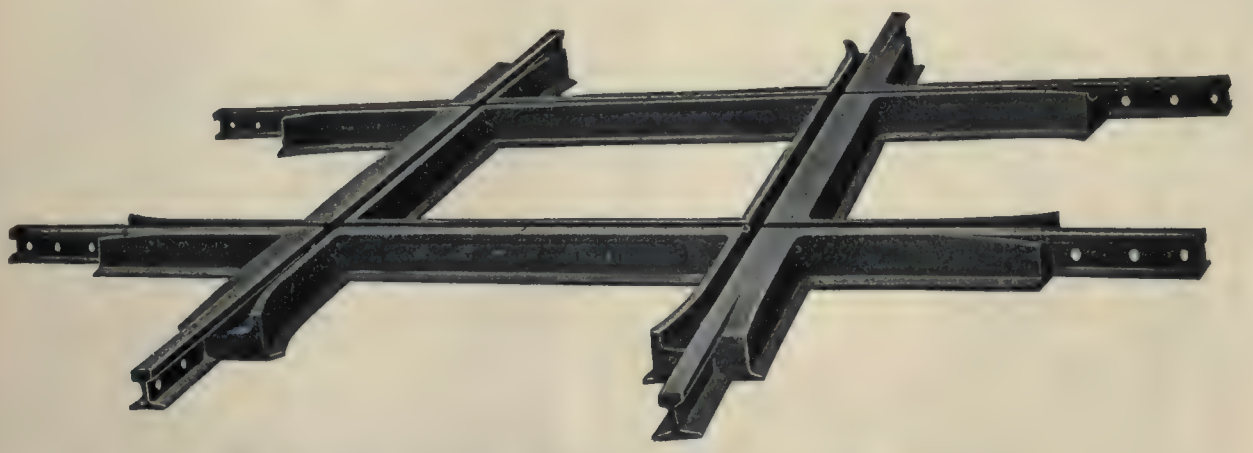
Dossert & Company

H. B LOGAN, President, 242 West 41st Street, N. Y.

Frogs, Crossings, Switches and Mates for Electric Railway Service

Products of the Highest Grade Workmanship and Material.

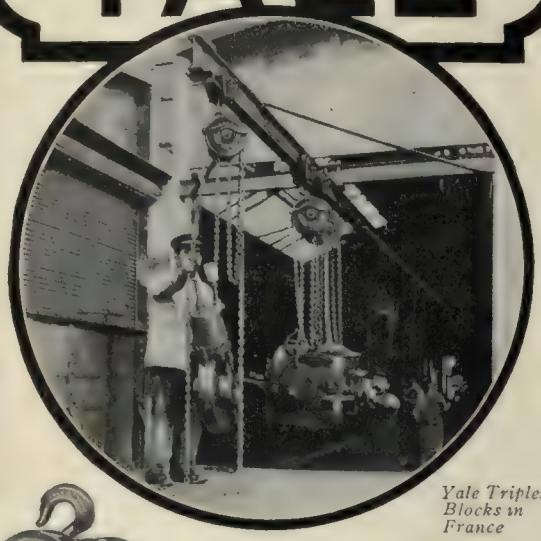
May we Estimate on Your Requirements?



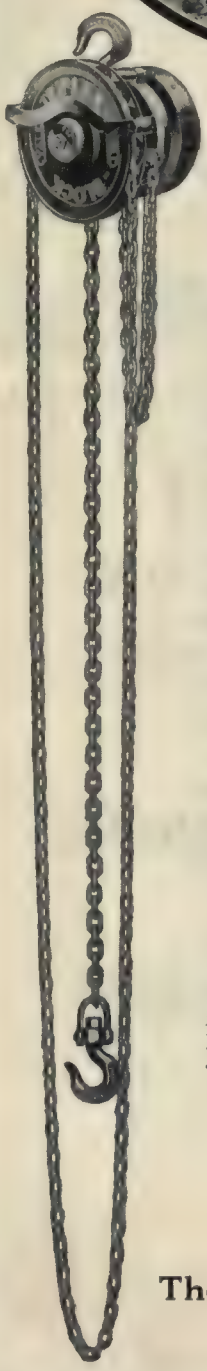
BARBOUR-STOCKWELL CO.

205 Broadway, Cambridge, Mass.

YALE



Yale Triplex Blocks in France



Tested Hoists

A Yale tested chain block is insurance against accident. It is rated on the basis of 2240 pounds to the ton and tested with 3380 pounds to the ton before shipment.

A chain block is invariably abused. It may be by overload, surging of the load or lack of attention.

The leading engineers ship Yale Triplex Chain Blocks to isolated mines, construction camps and plants in the far corners of the earth because Yale Hoists have great reserve capacity, are made of steel and require few repairs. We are today supplying perfect interchangeable parts for hoists sold twenty years ago

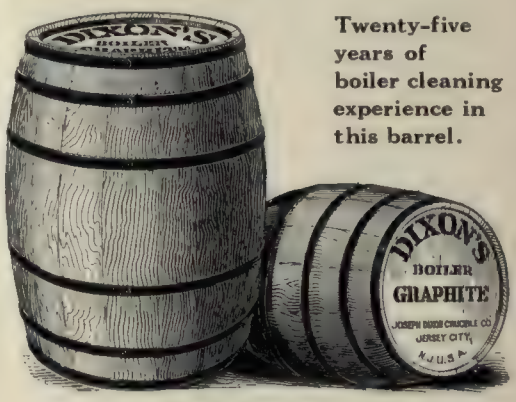
Put your hoisting problems up to us. Write for the 1915 Hoist Catalogue.

The Yale & Towne Mfg. Co.

9 East 40th St., New York

If You Want Boiler Economy

Assure yourself that your boiler is in such a condition that every pound of coal burned under it will return full value in steam. Then keep your boiler in this condition. And be sure that the means of boiler cleaning you use is not only effective but harmless and economical as well.



Twenty-five years of boiler cleaning experience in this barrel.

DIXON'S

The Pioneer

Boiler Graphite

Is the thing for you to use to obtain the highest boiler efficiency and the lowest boiler up-keep. The secret of its superiority lies in its finely ground **flake** form resulting from its natural crystalline structure.

These selected **flakes** have the unique faculty of penetrating to every part of the metal of the boiler interior, forming a thin coating of pure graphite to which no scale can adhere.

No boiler graphite which is not selected **flake** graphite has this faculty. Other kinds have a tendency to "ball up" and are therefore largely non-effective.

Every ounce of Dixon's Flake Boiler Graphite does useful work in the boiler. Every cent paid for it buys results. Even at a higher price it is more economical because, pound for pound, Dixon's does more work than the other kinds.

Boiler room management which makes no use of Dixon's Boiler Graphite is not thorough.

D X N TRADE MARK

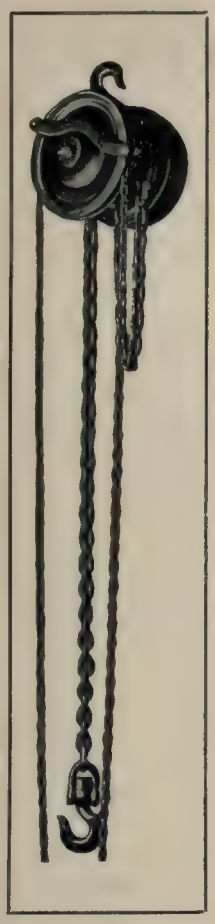
Send for your copy of "Graphite For The Boiler" No. 108 T

D X N TRADE MARK

Made in Jersey City, N. J., by the

Joseph Dixon Crucible Co.

Established 1827



FORD

TRIBLOC CHAIN HOISTS

are built in sizes from ¼ ton to 40 ton capacity. It has planetary gearing (which is enclosed in a dust-proof steel case), steel parts, a 3½ to 1 factor of safety in its weakest parts, and eighty per cent of the power applied to the hand chain is converted into lifting energy.

The chains and hooks used on the Ford Tribloc are of the best material and workmanship procurable, and all our claims are backed by a five-year guarantee.

Write for our catalogue today and learn fully of the merits of the Ford Tribloc.

Ford Chain Block & Mfg. Co.

142 Oxford Street **PHILADELPHIA, PA., U. S. A.**

A RAILWAY SHOP NECESSITY

Telescopic Ram Hydraulic Motor Lift 10,000 lb. Capacity

Note—The Close Clearance when ram is down.
" The High Lift when ram is extended.
" The Broad Wheels for easy movement about the floor.
" The convenient Position of Pump.
" The Hand Wheel for sideways adjustment.

Here is a motor lift designed for use where subpits are undesirable, or where there is insufficient height in the regular pit. With ram down it is but 32 inches high, and has a ram movement of 37 inches. It is built in capacities to 10,000 pounds, sufficient to lift the heaviest loads in street railway shops.

This is but one of our many types and sizes of motor lifts, pit jacks, wheel presses, forcing presses, jacks, etc., built especially for street railway service.

Write for catalogs and advice. Your inquiry will receive the benefit of our 60 years experience.

Showing Ram Extended

The Watson-Stillman Company

Engineers and Builders of Hydraulic Machinery

46 Church Street, New York

Chicago, McCormick Bldg.; Philadelphia, The Bourse; Pittsburgh, Brown & Zortman; St. Louis, Corby Supply Co.; Kansas City, Geo. T. Cook; Denver, L. C. Ullrich.

Saving $105.17 at a Cost of $8.91

Is the Amount "Earned" for the Indianapolis Traction and Terminal Company on one damaged Motor Frame by

An OXWELDING Outfit

The equipment was the upper half of a Motor Frame. Nature of repairs—welding gear case suspension lug. As it stood the motor frame was fit for the scrap pile. A new top half of the frame replaced would have cost $105.17. The repairs were accomplished at a total cost of just $8.91 by means of an OXWELDING OUTFIT.

This example indicates how the OXWELD PROCESS can save many times its cost in a few months in any ordinary electric railway shop. Its applications are almost unlimited. It makes possible the greatest economies in time and money in the repair and reclamation of cracked and broken equipment and machinery of all kinds.

It avoids the loss of valuable time waiting for new parts. It is worth while getting the details and learning of its value to YOUR road TODAY. Write for literature.

At Indianapolis Traction & Terminal Shops. Oxwelding on Broken Gear Suspension Lug

Oxweld Acetylene Co.

Newark, N. J. ***Chicago***

Largest Makers of Welding and Cutting Equipment and Supplies in the United States

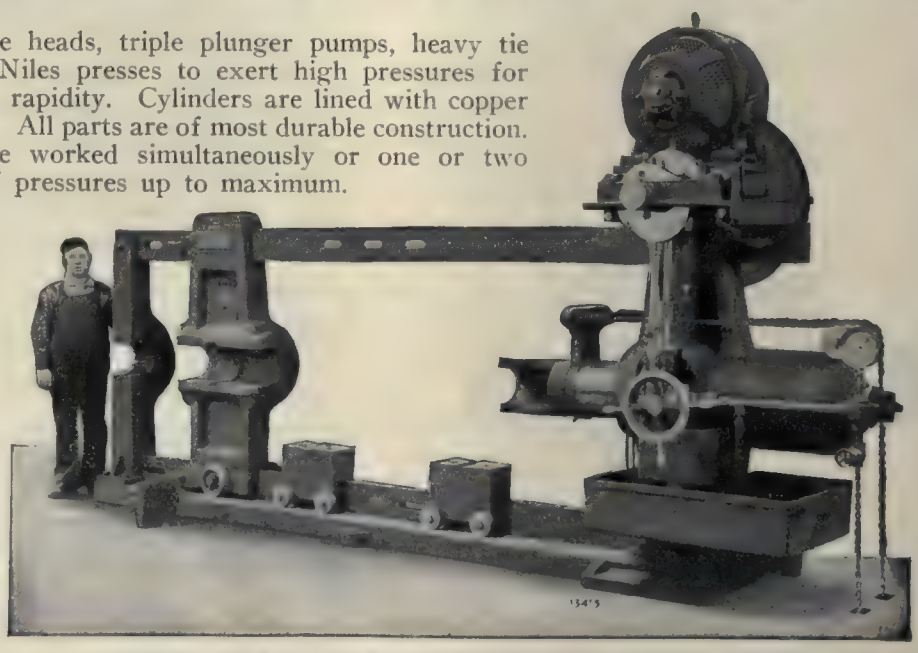
Niles Hydraulic Car Wheel Presses

Steel cylinders and resistance heads, triple plunger pumps, heavy tie bars and base plates enable Niles presses to exert high pressures for forcing wheels on or off with rapidity. Cylinders are lined with copper spun into place and burnished. All parts are of most durable construction.

All three plungers may be worked simultaneously or one or two thrown out, giving variety of pressures up to maximum.

Complete Electric Railway Shop Equipment

Write for Catalog "Wheel and Axle Machinery" or Information on Any Particular Machines



48-INCH, 300-TON NILES HYDRAULIC CAR-WHEEL PRESS

STEAM HAMMERS

NILES-BEMENT-POND CO.

111 Broadway New York

ELECTRIC TRAVELING CRANES

Boston Pittsburgh Birmingham, Ala. Philadelphia Chicago St. Louis London
Cleveland Cincinnati Hamilton, O. Detroit

WATCH YOUR PUNCH

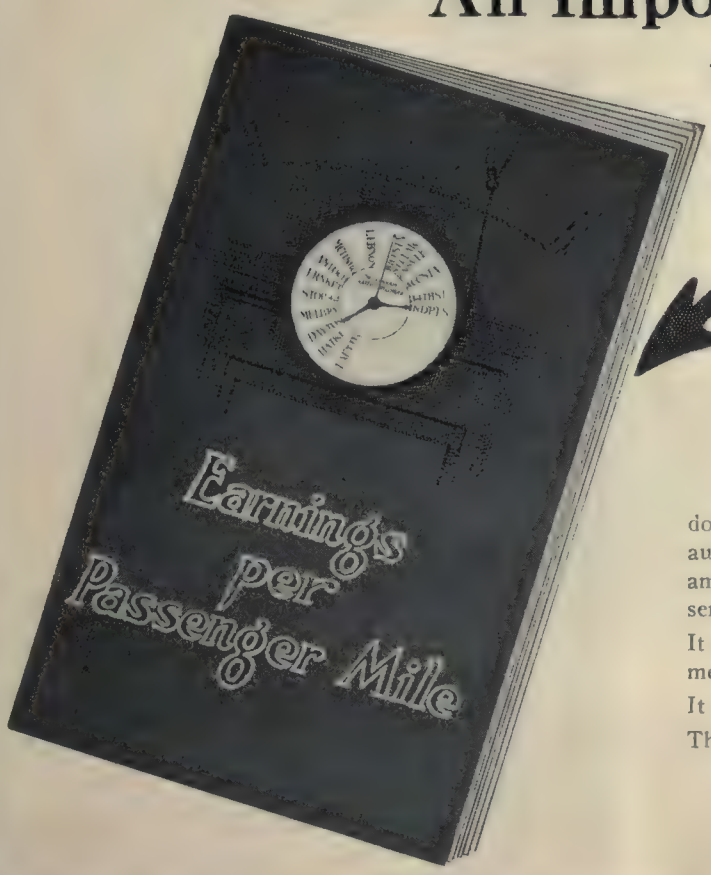
B-V.
TRADE MARK
REGISTERED

If it has the B-V trade mark proceed to buy with safety. Write for catalog.

BONNEY-VEHSLAGE TOOL COMPANY

124 Chambers Street, New York — Factory, Newark, N. J.

An Important Contribution to the Fare Question



It tells the story of a fare recorder which operates on the basis of the mileage travelled by the person paying the fare—

The Bonham Traffic Recorder

does that and it does more. It classifies each fare for the auditor, so allowing him to know with exactitude the amount earned by every train and the earnings per passenger mile.

It supplies to the operating department a tabulated statement of traffic between stations by trains.

It offers the solution of all your fare collection problems.

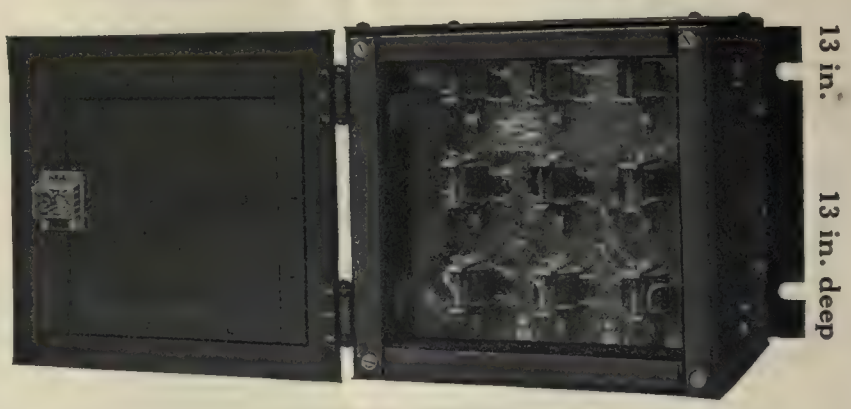
The catalog should be in your hands. *Write for it.*

The Bonham Recorder Co.
Hamilton, Ohio

End Car Lamp Flickering

Install the Watson Voltage Regulator

14 inches 17 inches



PATENTS PENDING

IT WILL KEEP THE VOLTAGE IN THE LIGHTING CIRCUITS WITHIN 7% VARIATION EVEN WHEN LINE VOLTAGE FLUCTUATES FROM 650 TO 300 VOLTS.

You do not have to make any important car wiring changes.

The Regulator itself is simple in character and requires no attention after installation, except a yearly change of small contacts.

Acquaint yourself at once with the Watson. Full information will be sent you at your request.

If desirous of knowing cost of installing the Regulator on your cars, send us wiring diagrams and voltage and amperage of headlight.

Thos. S. Watson Company, Milwaukee, Wis.

Trade Mark Reg. U. S. Pat. Off.

On a Merit Basis Only

There could be no other way of establishing a sales record of a million trolley wheel bushings in one year. Large reorders are not sample orders. The service tests have all been made.

If your road has not yet adopted "Bound Brook" Trolley Wheel Bushings, we want to suggest them to you as a relief for all bushing troubles. Their bearing surface of alternate bronze and fine graphite will give you unusually good wheel operation. You secure uniform lubrication and long bushing life. Your wheel worries will cease.

Ask the users.

All genuine graphited "Oil-less Bearings" have always been made at Bound Brook, N. J., in the United States of America by the

Graphite Lubricating Co

"I made it on 100 ampere hours"

ECONOMY SANGAMO METERS

BUILT LIKE A WATCH

ROCKFORD & INTERURBAN RY. CO.
SANGAMO METER RECORD

Line Freeport
Date 9-27-14 Car No. 711
Motorman 857 Conductor

LARGE DIAL READINGS

On Duty 20
Off Duty 120 Diff. 100
No. Trips Mileage 174.6

(To be filled in by Int. men only)

TRAIN NO.	FROM	TO	MILES
10	" 13	" 21	14.5
15	" 21	" 1	43.9
20	" 1	" 21	43.9
25	" 21	" 1	43.9
30	" 1	" 13	28.4
	"	"	

NOTE—Parts of trips lost, any defects in cars, etc., show below:

Encourage Economy

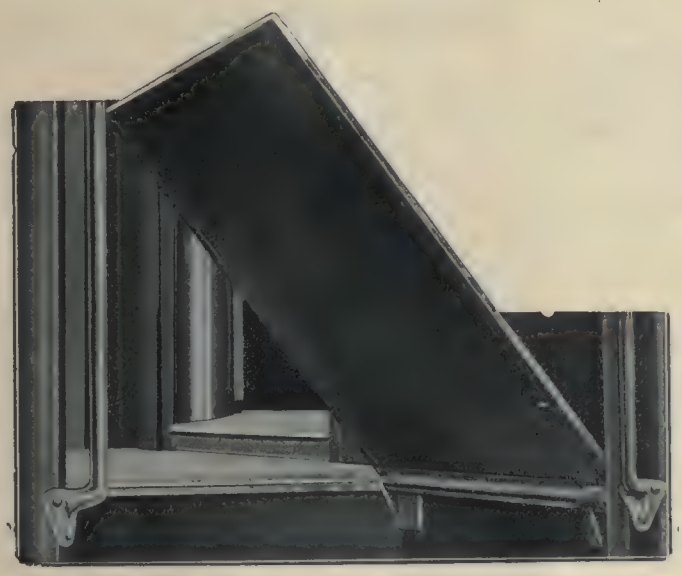
by instituting a healthy rivalry of motormen toward economical ends. By posting the amount of energy consumed on given runs by different motormen, each man is compared with other men on an absolutely fair basis.

If you are directing your efforts toward a reduction in power demand—the measurement of the power each man uses on each run is therefore necessary.

Sangamo Economy Meters (and they alone) enable you to do this. Write us for actual operating figures to show results accomplished by Economy meters.

Sangamo Electric Company
Springfield, Illinois

For Your Interurban Cars



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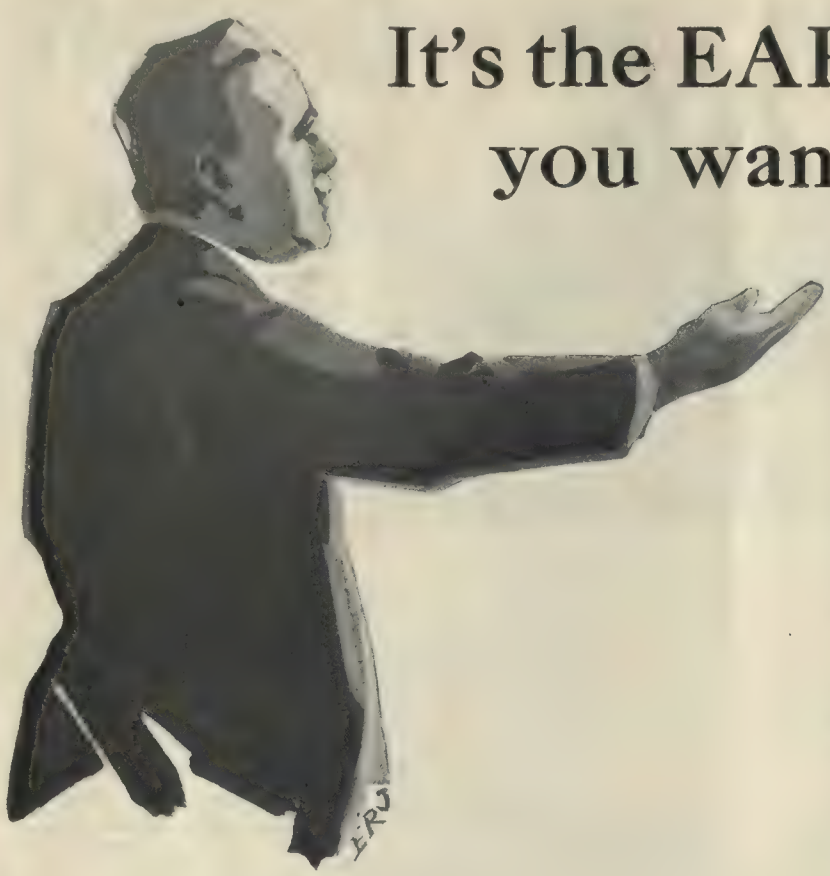

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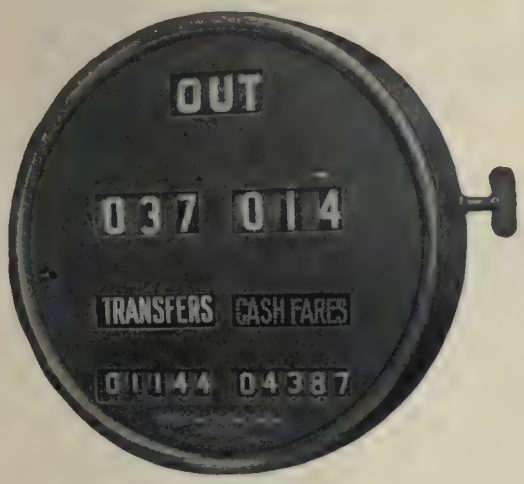

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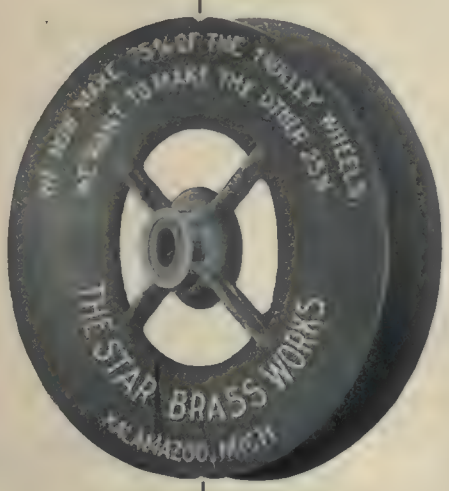

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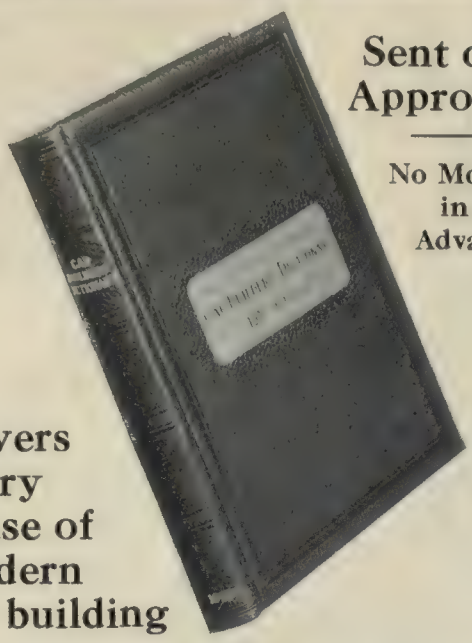

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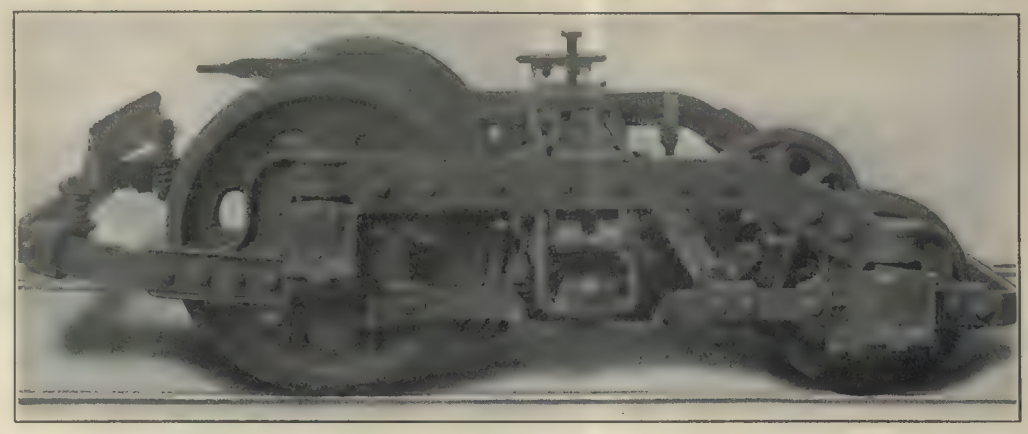

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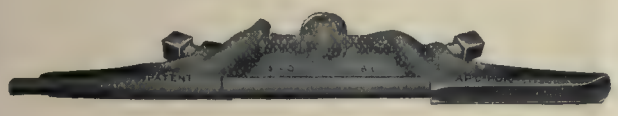

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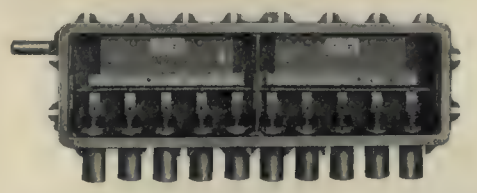

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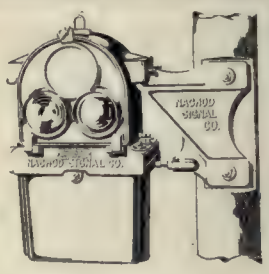

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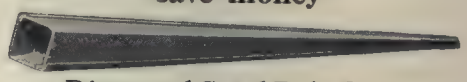

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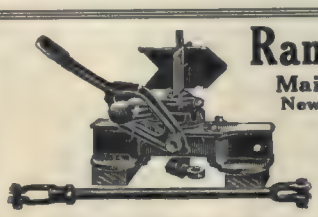

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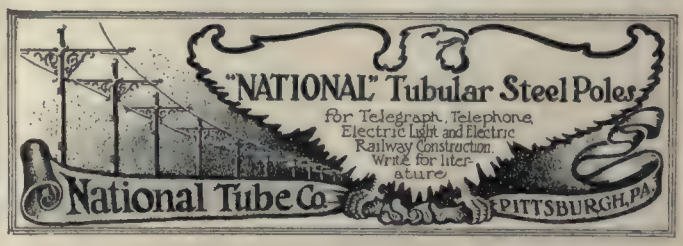

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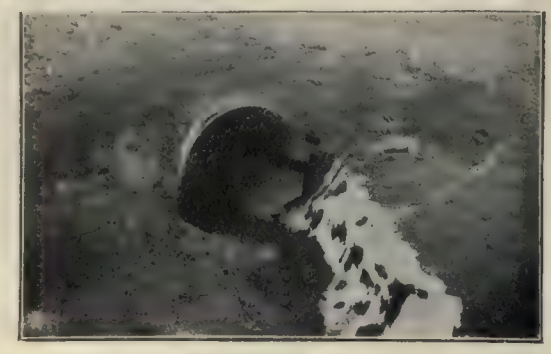

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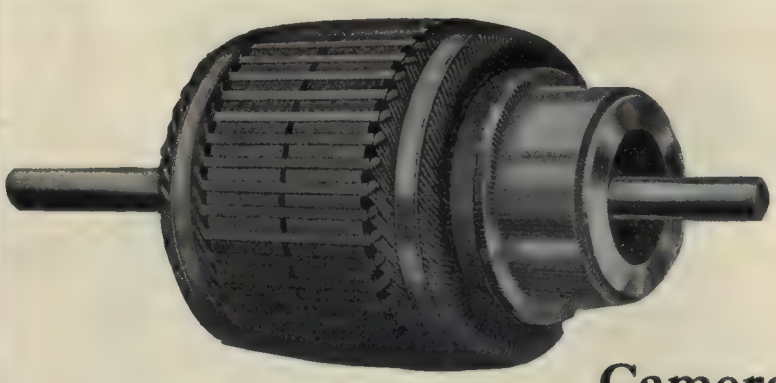

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Puttyless Skylights

The greatest Electric Railway shops in the country are skylighted. The Harvard Road Shops of Cleveland City Ry., have 50,000 sq. ft. of "Anti-Pluvius." The Drouvé design means success and a satisfactory skylight installation.

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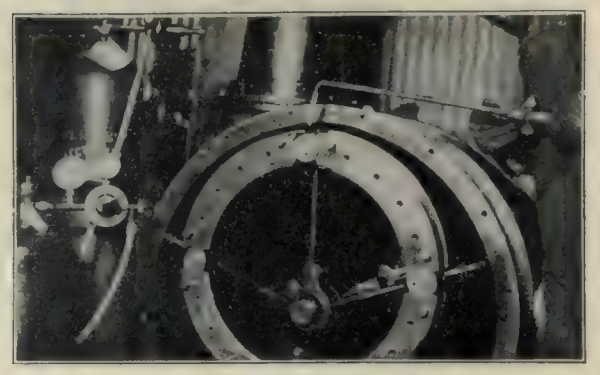

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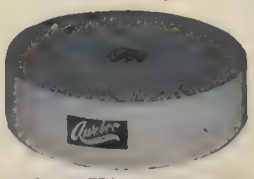

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are produced according to the specifications laid down by Railway Motor Manufacturers. Popular with manufacturers of motors because always right as to width and thickness of material, breaking strength, yarns, warp ends, and other standard requirements. The prices and material invariably satisfactory.

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There is a Sterling product best for every insulating purpose.

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A black, quick-drying protective varnish made especially for electrical wiremen and contractors and telephone and electric light systems. It has high insulating properties and is not affected by the extremes of heat or cold. It also repels moisture and resists the action of alkalis, gases and acids.

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No. 304B size for pipe, bent pipe, bolts and nipples.

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Here's an actual story from a Virginia railroad shop. The General Superintendent purchased one Oster 304 B Pipe Threading Machine for a try-out. A little later he purchased eight more. When asked why, the superintendent replied—*"I appreciate a good thing when I see it and buy more."*

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Many lines specify Micanite because its final cost is far below that of even the cheapest insulation.
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MICANITE Commutator Insulators, Tubes, Washers, Rings, Segments, Sheets, Tapes, etc., made of imported mica.

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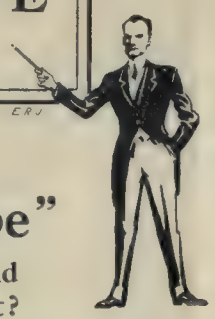

Why Does "Deltatape"

Save Ribbon-Wound Field Coils From Burning Out?

Because "Deltatape" withstands temperatures up to 500° F., Deltatape-wound coils are practically heatproof.

Your car motors must be able to carry overloads. And overloaded coils are overheated coils. Ordinary cotton insulation breaks down under the heat — and your motor coils are "short-circuited" and burn out.

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Better investigate this "Deltatape." It's a coil cost cutter. Write us for data.

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This Box Is

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Try these boxes on your one-man cars

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The JOHNSON Registering Fare Box

—increases fare receipts 2 to 15 per cent.

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For Cash Fares

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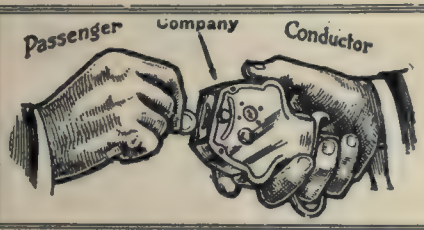

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Our forty years of successful punch making are well demonstrated in the perfection of our product, which is Standard throughout the world.

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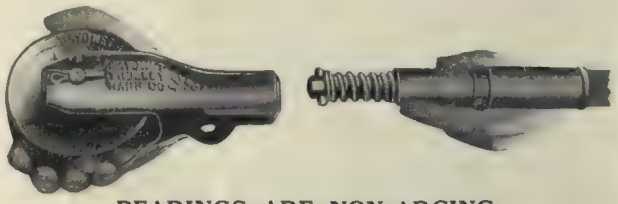
Changes a Bayonet Trolley Wheel and Harp, or a Trolley Pole in a Bayonet Base, which have been properly adjusted, aligned and lubricated at the repair bench where you have everything handy to do it. Stop delaying traffic to half-way repair or lubricate your trolleys on top of the cars. The Bayonet way insures perfect traction and a saving of one-third of your trolley wheel expense.



BEARINGS ARE NON-ARCING

in Bayonet Harps. The axles are proportionately longer than most trolley axles and the ends are firmly gripped by extra long bearings, which, with the largest contact washers made, give perfect conductivity. Use the Bayonet for efficiency and economy. Sold, subject to your approval, by

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Carefully assembled. Built of high grade materials. Positive in action.

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Lifts Load from many angles

Here's a jack that takes hold of any load with a hurry-up lift that clears up trouble with a rush. It's the

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Made of heavy steel and malleable castings with specially heat-treated forgings by expert workmen. Lifts 16 tons. Get prices.

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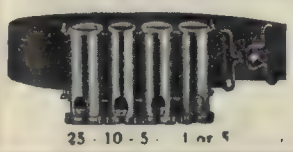
THE RAPID READY CHANGE CARRIER



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enables conductors to give change quickly. Passengers can pass into car immediately—Prevents crowded platforms—Shortens time at car stops. Just what you need. Price, $1.75.

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Ventilation—Sanitation—Economy—Safety

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THE COOPER FORCED VENTILATION HOT AIR HEATER

Patented September 30, 1913. *Ask for the full story.*

We Also Manufacture Pressed Steel Hot Water Heaters

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MAKE THE BEST

THE RAILWAY SUPPLY & CURTAIN CO.
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CAR CURTAINS & FIXTURES FOR ALL PURPOSES

CATALOGUE ON REQUEST

Heating and ventilating your cars is the problem today. Let us show you how to do both with one equipment. Now is the time to consider this change before you start your cars through the shops for overhauling. Kill two birds with one stone.

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—at New Iberia, La.

The cars on the lines of the Southwestern Traction & Power Company have "Globe" ventilators—and real ventilation down there is important.

That's why "Globes" were chosen.
First cost is last cost.

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for Lighting
INTERURBAN CARS
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Every Electric Railway man should see this Important Development in Car Lighting. We will be glad to explain it by letter to those not attending the Convention.

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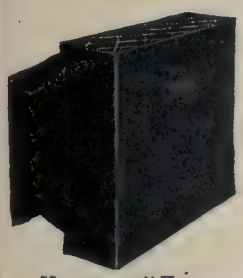
You are obtaining not only the Highest Efficiency but the Greatest Possible Economy in both First Cost and Maintenance when you Install

UTILITY Car Ventilators



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for Side Deck
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These ventilators are made in different types, to meet widely varying conditions. Through constant study of the field, our engineers can tell you the type best suited to meet your particular ventilating conditions. Put your problem up to us.

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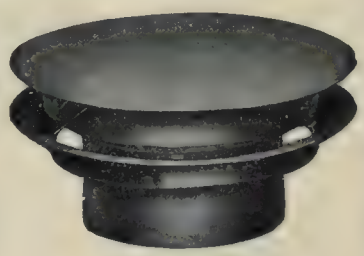

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Eclipse and Acme Fenders Give Immunity from Accident Suits

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The Eclipse Trolley Retriever

is designed for any range of service. Retrieves in less than three inches. Compulsory set; weak spring controlled by thumb nut on face of casing. No tools required for winding or adjusting. Fool proof. Furnished with open or closed rope drum. Use knotted rope or ferrule, as preferred. Less parts than any other retriever on market.

Will send sample for trial.

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RAILWAY SUPPLY CO.
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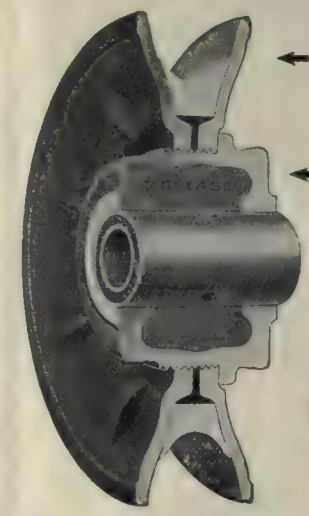
Universal Trolley Wheel



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Simple—Yes —and

THE PRICE WILL INTEREST YOU.

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The Car Was Entirely Consumed by the Flames—

Are you going to contribute this year to the annual heavy car losses from fire?

Or are you going to safeguard company interests and passenger interests by equipping your lines with the

Pyrene Fire Extinguisher

It is not only a fire extinguisher—it is an electric-fire extinguisher. Pyrene makes that possible because it is a highly insulative liquid.

You not only need it for cars, but for station, substation, subways, and wherever fire is possible in connection with the use of electric currents. Send for the Pyrene facts as they affect electric operation.

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Pneumatic Sanders, Valves, Hoppers of Special Design, Spring Wire Hose, Hose Clamps, and Cotton Hose.
Deck and Roof Car Ventilators.
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Soon Pays for Itself
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MASON SAFETY TREADS—prevent slipping and thus obviate damage suits.
KARBOLITH CAR FLOORING—for steel cars is sanitary, fireproof and light in weight.
STANWOOD STEPS—are non-slipping and self-cleaning.
Above products are used on all leading Railroads. For details address

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TULC

TULC vs. OIL

Four cars—all making the same mileage. Two cars were packed with TULC—two with oil. These cars were packed about eighteen months ago. The two cars on oil had to have the motor axle bearings changed on account of wearing out. The original bearings are still running in the cars lubricated with TULC.

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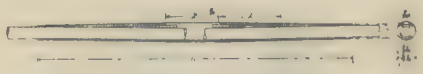
The Kisinger "K-I" Splicing Sleeve



The well-known Kisinger "K-I" splicing sleeve is now manufactured in improved design by this company. Established in 1893 it has been giving satisfactory results in service the world over.
Simple in construction—efficient—positive.

Get further facts, today.

STANDARD RAILWAY SUPPLY CO.
Succeeding Standard Pulley Co.
Station A Cincinnati, Ohio

Murphy Automatic Furnace

RAISES the possibility of efficient stoking to a maximum.

Write for catalog "C."

MURPHY IRON WORKS
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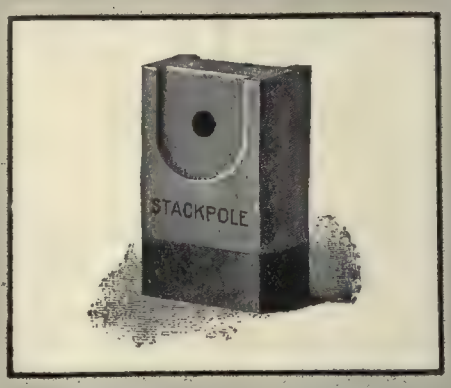
Stackpole Carbon Co.

Manufacturers of Motor and Generator Brushes



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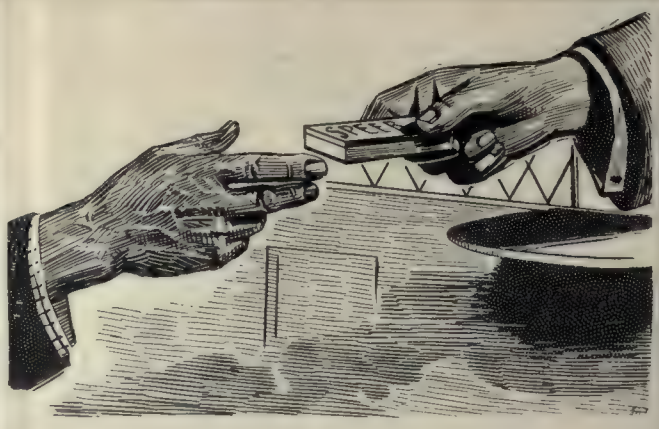
Carbon Specialties

St. Marys, Pa.



Give him a Set of *Speer* "G"

There is a set of Speer "G" railway motor brushes waiting to prove that further brush economy can be effected on your road. Send for it now and let the storekeeper give the "G's" out on the next requisition.

Speer Carbon Co., St. Marys, Pa.

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Helps Keep Your Car Out of the Repair Shop

There is no doubt that the use of Post's "Zero" Metal is saving many companies large sums which repair work on car axles would represent. It is a car-bearing metal PAR EXCELLENCE.

And for motor-bearing purposes, Post's Motor Metal is an equally economical factor. Both are made of Virgin raw materials only.

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When only the inner portion of the tread needs grinding — here's the style of

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that will correct the difficulty without removing the car from service. We have a shoe to fit any style of head any sized wheel.

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The waterproof, sun-proof, storm-proof, age-proof specially prepared canvas roofing.

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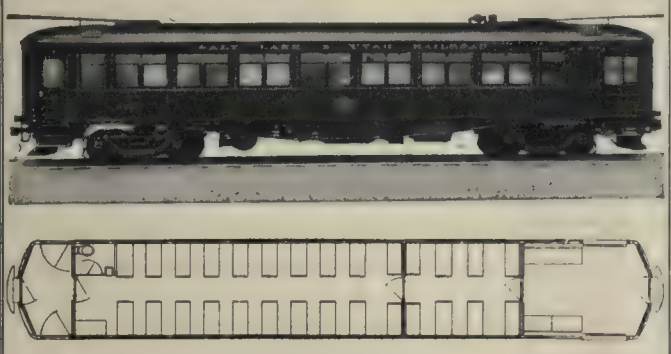
THE ELECTRIC STORAGE BATTERY CO.
PHILADELPHIA

Niles Car & Manufacturing Co.
Niles, Ohio

This steel interurban motor car is 61'8" long, 9'6" wide, is geared for 60 m.p.h., seats 66 persons, has ample space for baggage, and is built for hauling trains, yet it weighs only 43 tons complete on track with quadruple 110 h.p. motors, 750-1500 volt D C., automatic air breaks with dynamotor, and Baldwin trucks with 36" M. C. B. steel wheels. We now are shipping a duplicate order.



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We Build Cars for Electric Railways Only

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J. M. Jones' Sons Company
Builders of Cars for Electric Railways Exclusively
Established 1839 Incorporated 1911
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SEARCHLIGHT SECTION

FOR SALE

2—28′ 10″ Paywithin Cars, 4 G.E. 80 motors, Brill 27 G Trucks, AA1 Air Brakes.
1—Double Truck Sprinkling Car, 4,000 gallons capacity.
30—Brill 20′ Closed Cars, G.E. 1000 M., Brill 21-E Tr.
20—Jones 20′ Closed Cars, G.E. 52 Motors, Bemis Trucks.
2—Jackson and Sharp 18′ Car Bodies.
10—42′ Kuhlman Int. Cars, Bald. Tr., 4 Wgh. 121 Motors.
20—Comb. Int. Cars, Bald. Trucks, 4 Wgh. 119 Motors.
8—Brill 22′ Closed Cars, Wgh. 68 Motors, Peck. Trucks.
1—Jackson and Sharp 18′ Car Body.
4—Brill 30′ Express Cars, Brill 22-E Trucks.
9—Brill 30′ Express Cars, complete, 4 G.E. 1000 Motors, AA1 Air Brakes, Brill 27-G Trucks.
10—Wason 10 B. Open Cars, G.E. 1000 Motors, Bemis Tr.
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8—Brill 14 B. Open Cars, Wgh. 56 Motors, Brill 22-E Tr.
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40—G.E. 90 Railway Motors, complete.
20—G.E. 66 Railway Motors, complete.
103—G.E. 88-B brand new Motors, complete.
12—G.E. 73 Railway Motors, complete.
24—G.E. 87 Railway Motors, complete.
20—G.E. 57 Railway Motors, complete.
20—G.E. 80 Railway Motors, complete.
12—G.E. 54 Railway Motors, complete.
60—G.E. 1000 Railway Motors, complete.
60—G.E. 800 Railway Motors, complete.
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4—West. 68 Railway Motors, complete.
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3—West. 93A Armatures, brand new.
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44—K11 Controllers. 30—K14 Controllers.
28—K2 Controllers. 28—B29 Controllers.
2—Sets Brill 27G Trucks, 4′ 6″ wheelbase.
6—Brill 21E Trucks, 7′ 6″ and 8′ wheelbase.
10—Dupont Trucks, 7′ 6″ wheelbase.

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1—100 KW. Gen. Elec., type TC, form A, 550 volts, 182 amps. DC., 340 volts AC., 1200 RPM.

25 CYCLE ROTARY CONVERTER

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GET OUR PRICE WE CAN SAVE YOU MONEY

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A COOPER Union student, 3d year electrical engineering course, desires a position at anything in engineering. Box 763, Elec. Ry. Jour.

A MASTER mechanic with nine years' experience in street and interurban railway equipment, maintenance and construction, is open for a position. A strictly up-to-date organizer, who knows how to effect economies. Address Box 752, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago.

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GENERAL superintendent, married, age 37, desires similar position; twelve years' practical experience, seven with one corporation, serving as car repairman, power house foreman and electrician, time table clerk, chief claim agent, division superintendent, superintendent of employment and assistant general superintendent. Box 753, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

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AUDITOR—Experienced. Good reference to handle railway and lighting properties. Good opening. Address Box 760, Elec. Ry. Jour.

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Saves Time, Labor and Money

A boy can tape 40 coils for Westinghouse 12A Armature in an hour. Further particulars gladly furnished.

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SEARCHLIGHT SECTION

60 Cycle, Rotary Converters

2—General Electric 1000 K.W., 600 v., 360 R.P.M., type "HC," comp. wound, 6 phase. Complete with air cooled 2300 v. trans., reactances and panels.
2—General Electric 500 K.W., 575 volt, 600 R.P.M., type "H.C," comp. wound, 6 phase. Complete with air cooled trans., 2300 v. reactances and panels.
1—300 K.W. Westinghouse, 600 volt D.C., 370 volt A.C., 600 R.P.M. with oil cooled G.E. trans. 11,000 v. primary.
1—200 K.W. Westinghouse, 600 volt D.C., 370 volt A.C., 720 R.P.M.
Also following transformers:
2—125 K.W. G.E. 2400 volts prim., 370 volts sec.
6—75 K.W. Ft. Wayne, 10,000-9000-185-370 v.
3—175 K.W. Stanley, 10,000-2300 volts.

25 Cycle, Rotary Converters

1—500 K.W. General Electric, 3 phase, 25 cycle, 600 volt D.C., 370 volt A.C., 375 R.P.M.
2—300 K.W. Genl. Elect., 3 ph., 25 cycle, 750 R.P.M., 600 volts.
1—250 K.W. Genl. Elect., 3 ph., 25 cycle, 500 R.P.M., 600 volts.
Can also furnish transformers—all voltages.

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READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Over 300 different products are here listed.

The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

Acetylene Regulators.
Imperial Brass Mfg. Co.

Acetylene Service.
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Cincinnati Car Co.
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Halsey & Co., N. W.

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Stackpole Carbon Co.
Western Electric Co.

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Edison Storage Battery Co.
Electric Storage Battery Co.
Western Electric Co.

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Post & Co., E. L.
Taylor Elec. Truck Co.
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Baldwin Loco. Works.

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Graphite Lubricating Co.

Bearings, Roller and Ball.
Hess-Bright Mfg. Co.
Railway Roller Bearing Co.

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Reiter, G. C.
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Watson-Stillman Co.
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Bushings, Rubber.
Imperial Rubber Co.

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Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc.—see those headings.)

Car Trimmings. (For Curtains, Registers, Doors, Seats, etc. —See those headings.)

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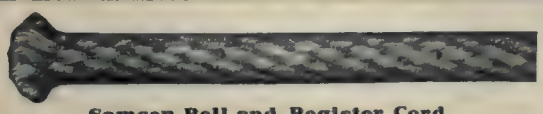

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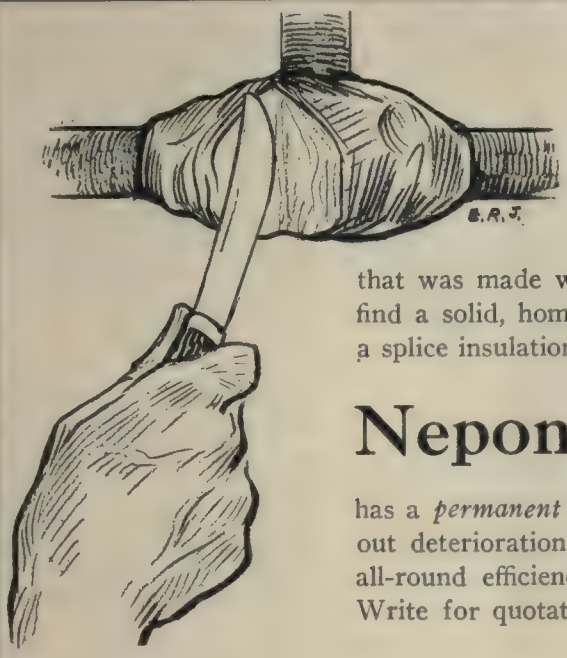

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has a *permanent* efficiency that enables it to meet all service conditions without deterioration. This permanency of dielectric strength, adhesiveness and all-round efficiency renders it of great value for important insulating jobs. Write for quotations.

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71675

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In the electric railway industry, such men find the easy, certain and thorough way to keep in touch with manufacturers is through the advertising pages of the

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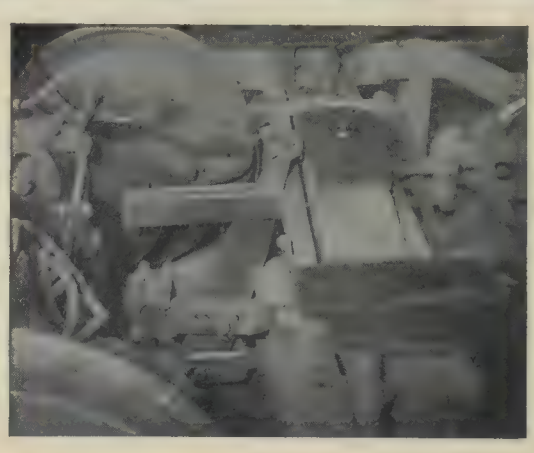

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S.W.B. Automatic Shim Slack Adjuster

prevents flat wheels; insures quick, uniform application of brakes; reduces wear of wheels; saves time of men and gives brake shoes a double life.
Write for descriptive bulletin—a money-saving, time-saving story.

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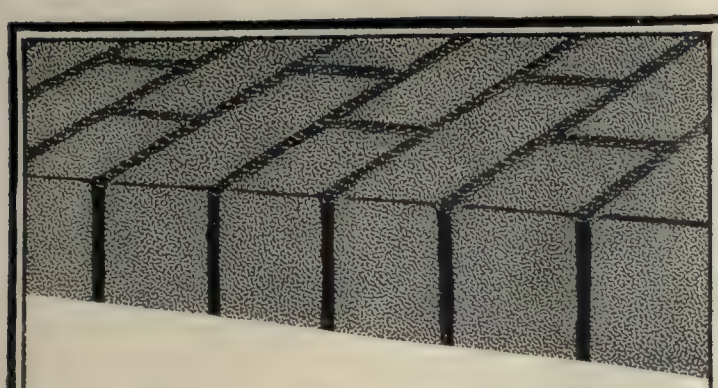
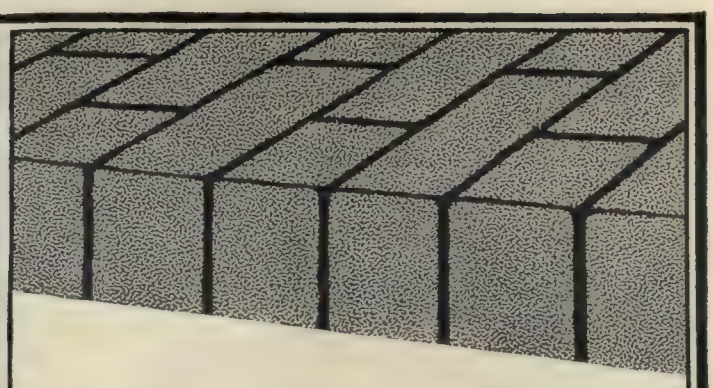


In Cold Weather
the blocks contract, the joints widen, the pitch sinks and keeps the seal intact.



In Hot Weather
the blocks expand, the joints grow narrow, the pitch squeezes upwards. The seal is intact.

Barrett's PAVING PITCH

Every Joint an Expansion Joint

THE use of cement grout as a filler for brick pavement attempts to defy one of the oldest laws of nature. In hot weather, brick will expand; in cold weather, contract. When brick and cement are combined in one pavement, making a great monolith, tremendous internal stresses reveal themselves, sometimes by explosion, when the pavement buckles up with a shower of fragments. Sometimes the expansion throws the curb out of line or develops long, unsightly cracks.

To remedy this condition, engineers attempted more or less unsuccessfully to provide for expansion by the use of an expansion joint filled with a plastic material.

If the block is of inferior quality, the use of cement in the joints may serve to protect the edges from abrasion by traffic, but good brick requires no such protection, especially if the bricks are laid properly, close together. On the other hand, expansion joints, coming at a distance of 8 or 10 feet apart, must necessarily be so wide, in order to take up the great expansion, that protection of the edges is impossible and so in old cement-filled pavements you will find wide grooves running across the pavement at the expansion joint where the exposed edges of the last line of bricks have been hammered into dust.

The use of Pitch Filler instead of cement obviates all these difficulties. Every joint is an expansion joint. In cold weather the pitch sinks in the joint as the block contracts, but as every joint is an expansion joint the amount is infinitesimal. In warm weather the pitch merely rises a little in the joint. In either case the pitch adheres firmly to the block, preserving an absolutely waterproof, perfect seal.

The best pitch for the purpose is Barrett's Paving Pitch.

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Union Spring & Mfg. Co.

Sprinklers, Track & Road.
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Universal Safety Tread Co.

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Green Eng. Co.
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Murphy Iron Works.
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Storage Batteries. (See Batteries, Storage.)

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Massachusetts Chemical Co.
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Switches & Switchboards.
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Tapes and Cloths. (See Insulating Cloths, Paper and Tape.)

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Terminals, Cable.
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Testing, Commercial & Electrical.
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Oster Mfg. Co.

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International Steel Tie Co.

Tie Plates.
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Cleveland Frog & Cross. Co.
Columbia M. W. & M. I. Co.
Falk Co.
Hadfield's, Ltd.
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St. Louis Steel Fdy.

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Universal Safety Tread Co.

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National Tube Co.

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Westinghouse Machine Co.

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National Tube Co.

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Wheel Truing Brake S. Co.

Wheel Guards. (See Fenders & Wheel Guards.)

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Wheels, Car, Cast Iron.
Ass'n of Mfrs. of Chilled Car Wheels.
Hadfield's, Ltd.
Long Co., E. G.

Wheels, Car, Steel and Steel Tired.
Hadfield's, Ltd.
Standard Steel Works Co.

Wheels, Trolley.
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American Steel & Wire Co.

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International Creo. & Con. Co.
Lindsley Bros. Co.
Northeastern Co., The.

Wrenches, Track.
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Representing forty-eight wheel foundries throughout the United States and Canada.
Capacity 20,000 Chilled Iron Wheels per day.

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Printing begins on Tuesday of each week.
Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.
New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.
If proofs before printing are required, changes of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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YOU
are cordially
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our
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leaves an impress on the lubrication cost sheet.

If it's improperly packed the best of lubricants can never right the wrong.

By working with the car house men Galena experts get them into the habit of properly packing journals.

Then by using Galena oils the cost goes down to bed-rock.

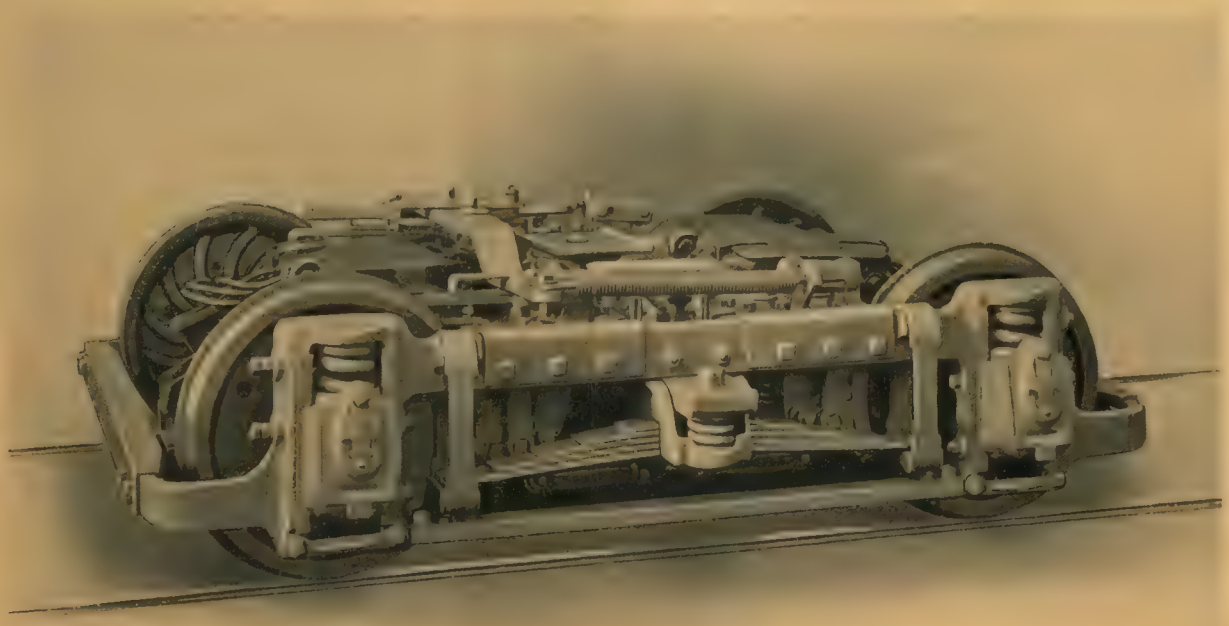
We *guarantee* the saving.

GALENA SIGNAL OIL COMPANY

Franklin, Pa.

3151

BRILL 77-E TRUCK



"THE illustration shows the Brill 77-E type of truck adapted to operate with 22-in. and 24-in. wheels and small inside-hung motors. The Brill solid forged side frames have very distinct advantages in this compactly constructed truck. Note the wide gusset plates which are depressed inside the side frames to carry the transoms low. Double-corner brackets give extra reinforcement to the transom connections. Extra clearance gained by the low end extensions and end frames is another apparent advantage. The ability to arrange the spring system to best advantage without being hampered by frame trussing and also to enable swing links to be placed at wide apart points on the frame is another feature afforded by the solid forged side frames. This spring suspension gives superior riding qualities to the truck and the combination of plate and coil springs graduates the spring action for light and heavy loads. In this particular truck for low carried cars, two coil springs are used under each end of the bolster in a spring seat which straddles the semi-elliptic spring and thus economizes space. The Brill Graduated Spring System, means that the bolster coil springs are automatically put in action under light loads."

THE J. G. BRILL COMPANY
Philadelphia, Pa.
AMERICAN CAR COMPANY
St. Louis, Mo.
G. C. KUHLMAN CAR CO.
Cleveland, Ohio
WASON MANUFACTURING CO.
Springfield, Mass.
COMPAGNIE J. G. BRILL
Paris, France

AGENCIES: PIERSON, ROEDING & CO., San Francisco, Los Angeles, Portland, Seattle. NOYES BROTHERS, Melbourne, Sidney, Dunedin, Brisbane, Perth. . . DUBBELMAN, 48 Rue du Luxembourg Brussels. SHACKLEFORD & CO., Calle San Martin 201, Buenos Aires. THOMAS BARLOW & SONS, Durban, Natal. SHEWAN, TOMES & CO., Hong Kong, Canton, Shanghai. G. CHECCHETTI, Piazza Sicilia, 1, Milan. LONDON OFFICE, 110 Cannon Street, E.C.

63 G-E Locomotives on the New York Central

Eight years ago thirty-five 115-ton G-E Locomotives, designed to haul 535-ton trains at 60 miles per hour, were placed in service.

Today, 63 G-E Locomotives are used in this electrification. The illustration shows the latest type placed in passenger service. The total weight of 125 tons is on the driving-wheels and the locomotive can haul 1200-ton trains at 60 miles an hour.

One phase of G-E electrification progress is indicated in the above figures—an increase of 124 per cent in train weight successfully operated by locomotives weighing only 15 per cent more than the original type.

Latest type G-E Locomotive hauling "Twentieth Century" on New York Central lines.

General Electric Company

General Offices:

Sales Offices

ELECTRIC RAILWAY JOURNAL

Volume 45
Number 24
June 12, 1915

McGraw Publishing Co., Inc.

Interurban Car of the Niagara, St. Catharines & Toronto Ry. Co., built by Preston Car & Coach Co., Preston, Ont., Can.

The "AUTOMATIC" VENTILATOR

provides a CONTROLLED "Intake" and "Exhaust"; it does NOT depend on DRAUGHTS around doors and windows for its fresh air supply. It costs little to install and nothing to operate or maintain. Thousands of electric and steam passenger cars equipped during the past 11 years.

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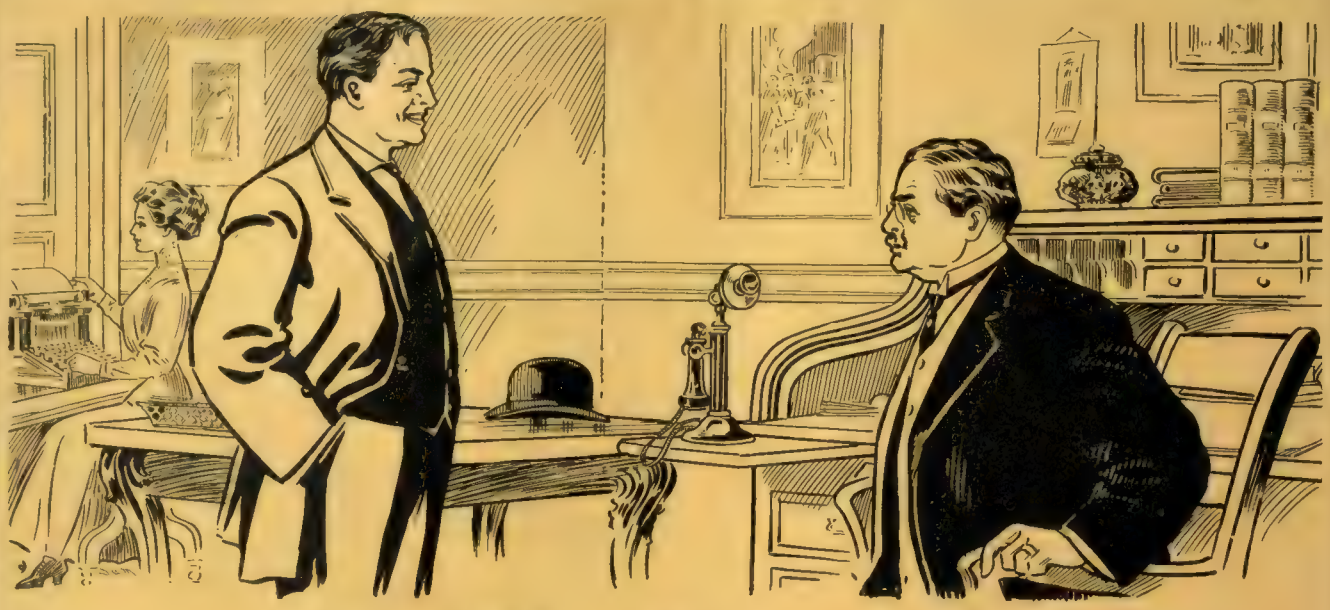

C E R A

Come Enjoy Relax Absorb

Midsummer Meeting of The Central Electric Railway Association

"JOE," said the General Manager to the Superintendent, "this year has brought its new problems, some of them the most difficult we railway men have ever been confronted with; we must find out what others are doing.—The C.E.R.A. provides an opportunity to do this. Two days on the beautiful steamer 'City of Erie' will give us all a chance to relax and confer with each other without interruption, so make your plans accordingly."

"That's fine, Boss," answered Joe, "Sam, our general foreman, has been aching for a chance to tell all his friends about the Westinghouse Light-Weight HL control and 323-V motors on our city cars.—He says that's one positive way to solve these problems,—to reduce cost; to give reliable service; and to make the car crews happy."

"ALL ABOARD" June 17th to 19th

Westinghouse Electric & Manufacturing Co.

Sales Offices in All Large American Cities

East Pittsburgh Pennsylvania

Electric Railway Journal

New York, June 12, 1915

Volume XLV No. 24

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New 44-ton cars 72 ft. overall have been placed in steam-operated suburban service on this line, the design providing for future installation of electric motive power equipment, although the strength of structure has been based upon the heaviest steam-railroad standards.

Electric Railway Journal, June 12, 1915. 7 cols. Ill.

Convention of N. E. L. A. 1106

The convention of the National Electric Light Association was held at San Francisco June 8-11. Abstracts of a number of the papers are published.

Electric Railway Journal, June 12, 1915. 8 cols.

Electrification of the Jamestown, Westfield & Northwestern Railroad 1110

This line, which was originally built to handle a freight transfer business between several trunk roads, has been transformed into a high-speed interurban railway to develop a passenger traffic between the many summer resorts along the line.

Electric Railway Journal, June 12, 1915. 4 cols. Ill.

Meeting of C. E. R. A. A. 1112

Three of the papers at the annual meeting at Indianapolis this week discussed respectively "Analysis of the Balance Sheet," "Electric Light and Power Accounting by Combined Railway and Light Property" and "Small Electric Line Handling Carload Freight."

Electric Railway Journal, June 12, 1915. 6 cols.

Master Mechanics Association 1115

At the forty-eighth annual convention at Atlantic City, June 9-11, reports were presented on electric locomotive maintenance, headlights and other subjects of interest to electric railways. An account of the exhibits is published.

Electric Railway Journal, June 12, 1915.

Communications 1119

A.C. Testing of Railway Motor Insulation. Flange-Bearing Special Work. Traffic Characteristics and Investment per Revenue Passenger.

Electric Railway Journal, June 12, 1915. 2 cols.

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Northern Texas Traction Weed-Cutter—*By R. E. Griffiths.* The Three-in-One Car—*By E. C. Sherwood.* G. E. 240-C Motor and P.C.-2 Control. Fiber Conduit Insulation for Feeder Taps. A Truck Designed for Low Maintenance Costs. Carbon-Vanadium Forging Steel. An Original Application of Signals for City Service.

Electric Railway Journal, June 12, 1915. 14 cols. Ill.

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INERTIA

(What It Means in Railroad Engineering)

INERTIA IS THE TENDENCY OF A BODY AT REST TO REMAIN AT REST; OR OF A BODY IN MOTION TO CONTINUE IN MOTION.

THE INERTIA OF ANY MOVING TRAIN CAN BE INDICATED IN TERMS OF ENERGY, WHICH IS EQUAL TO ONE-HALF THE MASS MULTIPLIED BY THE SQUARE OF THE VELOCITY, AND USUALLY EXPRESSED IN FOOT POUNDS.

IF A MODERN SIX CAR PASSENGER TRAIN WEIGHS 1,500,000 POUNDS AND ATTAINS A SPEED OF 60 MILES PER HOUR, IT HAS ACCUMULATED OVER ONE HUNDRED AND EIGHTY MILLION FOOT POUNDS OF ENERGY TENDING TO KEEP THAT TRAIN IN MOTION.

INERTIA IS WHAT THE AIR BRAKE IS UP AGAINST. THE CONTROL OF INERTIA OR THE ENERGY OF MOVING TRAINS WAS A MAN'S JOB IN 1870, WHEN AIR BRAKES WERE FIRST APPLIED. TODAY—45 YEARS LATER—THIS PROBLEM—WITH TRANSPORTATION ITSELF—HAS GROWN TO GIANT PROPORTIONS.

WHAT IS THE ANSWER?

MODERN BRAKES CONTROL MODERN TRAINS MORE PERFECTLY AND WITH GREATER SAFETY AND ECONOMY THAN EVER BEFORE IN THE HISTORY OF THE ART.

IF NECESSITY IS THE MOTHER OF INVENTION, THEN INERTIA IS THE FATHER OF THE AIR BRAKE.

Suggested by the

Westinghouse Traction Brake Company

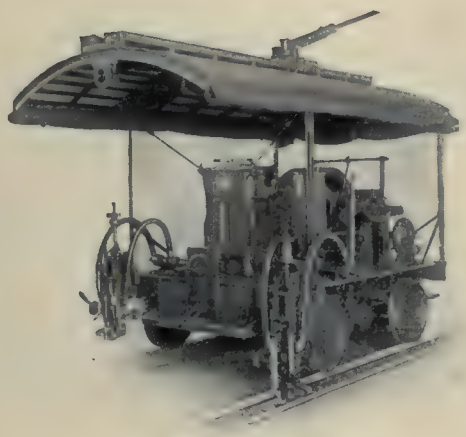
Works: Wilmerding, Pennsylvania

PITTSBURGH: Westinghouse Building
CHICAGO: Railway Exchange Building
NEW YORK: City Investing Building
ST. LOUIS: Security Building

ERICO

Rail Bonds

Electric Weld and Copper Weld



Portable Combination Plant
For Electric and Copper Welding

Electric Weld

THE well known Welded Rail Bonds as manufactured by The Electric Railway Improvement Company have been on the market for the last ten years.

After a careful investigation of the service this type of bond has given, the Westinghouse Company came to the conclusion that they should be added to their list of railway supplies.

Our salesmen in your locality will be pleased to discuss this method of bonding with you.

Write for Catalogue and Bonding Notes

Westinghouse Electric & Manufacturing Co.

East Pittsburgh, Pa.

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
Bluefield, W. Va.
Boston, Mass.
Buffalo, N. Y.
Butte, Mont.
Charleston, W. Va.
Charlotte, N. C.
Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio
Columbus, Ohio
*Dallas, Tex.
Dayton, Ohio
Denver, Colo.
Detroit, Mich.
*El Paso, Tex.
*Houston, Tex.
Indianapolis, Ind.
Joplin, Mo.
Kansas City, Mo.
Louisville, Ky.
Los Angeles, Cal.
Memphis, Tenn.
Milwaukee, Wis.
Minneapolis, Minn.
New Orleans, La.
New York, N. Y.
Omaha, Neb.
Philadelphia, Pa.
Pittsburg, Pa.
Portland, Ore.
Rochester, N. Y.
St. Louis, Mo.
Salt Lake City, Utah
San Francisco, Cal.
Seattle, Wash.
Syracuse, N. Y.
Toledo, Ohio
Washington, D. C.

*W. E. & M. Co. of Texas.

PUBLISHER'S PAGE

On Keeping Up and Advancing Modern Practice

The general manager of a Middle-West road in writing of the help he obtains from his Electric Railway Journal each week adds:

"I deem it just as essential and necessary to go through the advertisement section, in order that I may not overlook anything that would tend toward the keeping up and advancing of modern practice."

—a suggestion.

Make the Most of It

JOHNS-MANVILLE SERVICE TO THE ELECTRICAL INDUSTRY

YOUR assurance of quality in J-M Products is two-fold; first, the reputation of the concern which sells them—and second, the principle of responsibility which not only reinforces the quality of the products but assures all responsibility for their performance. J-M Products involve no experimenting—you run no risks and therefore there is no waste.

We are ready to quote you on J-M Tapes by the roll or by the ton.

The great demand and resulting large output of J-M Friction and Rubber Tapes has developed our equipment for the manufacture of these products to the greatest degree.

This equipment together with years of experience in making tapes to special formula, offers a unique advantage to the buyer.

Let us figure on your tape requirements and supply them from now on.

Whether cables are under water or overheated —J-M Niagrite will protect them

Here is a cable wrapping that is both non-hygroscopic and fire resistant. It will localize any abnormal heating effect in the cables and will prevent arcing over between adjacent cables. It is also impervious to water and is extremely hard and strong.

J-M Niagrite when applied is a flexible felt of an asbestos base, which after wrapping is saturated with J-M fire and waterproof compound. On drying, Niagrite becomes extremely hard and stone-like.

J-M Niagrite is specified by many Central Stations, Railway and Industrials as a standard sheathing for manhole, subway and switchboard locations.

Fifty years in producing Asbestos Fibre, woven, twisted and spun

This is the record that guarantees J-M Textiles.

The science of converting Magnesium Silicate (Asbestos) from the rock into sheets of woven material tubing listing, yarns and felting, is not a task that can be learned hastily.

The very experience we have had in solving the difficulties incident to this work makes us sure that the best textiles can be produced only by constant effort and study.

J-M Textiles have been perfected in the school of experience.

So that when you need Asbestos backing sheets for meter boards or other fireproofing, asbestos listing for cable racking, asbestos tubing for free swinging or racked conductors, or Niagrite for heavy cable sheathing, you can depend on J-M Asbestos Textiles to be the best that experience and high grade raw material can combine.

You can accordingly rely on them to give efficient service in wear and fire protection.

H. W. JOHNS-MANVILLE CO.

Akron	Boston	Columbus	Duluth	Kansas City	Minneapolis	Philadelphia	St. Paul	Toledo
Albany	Buffalo	Dallas	Galveston	Los Angeles	Newark	Pittsburgh	Salt Lake City	Washington
Atlanta	Chicago	Dayton	Houghton	Louisville	New Orleans	Portland	San Francisco	Wilkes-Barre
Baltimore	Cincinnati	Denver	Houston	Memphis	New York	Rochester	Seattle	Youngstown
Birmingham	Cleveland	Detroit	Indianapolis	Milwaukee	Omaha	St. Louis	Syracuse	

THE CANADIAN H. W. JOHNS-MANVILLE CO., LTD., Toronto, Winnipeg, Montreal, Vancouver

3226A—3151B—3225E—3130E

When It's Dark and Stormy

The Simmen Continuous Cab Signal

demonstrates its superiority over fixed signals more than at any other time

We have stated from time to time in our announcements that "the motorman can't run by a Simmen Signal—he runs with it."

Do you realize the significance of that statement? Do you appreciate its potent application in a "SAFETY FIRST" campaign?

In the equipping of a road with signals, the first thought of the railway company is obviously rapid operation of the cars with safety.

Glance at the above illustration again and note that the signals are in the motorman's cab—directly in the line of his vision—always staring him in the face—there's no chance to miss a signal. He can't look away from it while running his car.

Furthermore, that signal shows a continuous indication—a green light for proceed—a red light for danger or stop—and those indications cannot be obscured by gloom or fog or storm. They are BETWEEN the motorman and the obscuring elements.

Now glance at the picture at the lower left. On that revolving sheet of paper is perforated a moving picture record of the movement of every train on the line simultaneous with its entrance and departure at each prearranged "block."

If you are seeking a signal system embracing the maximum of safety at the minimum of installation and upkeep costs, investigate The Simmen System. It's worth *your* while to fully understand its advantages.

Simmen Automatic Railway Signal Co.

1575 Niagara Street, Buffalo, N. Y.

To the man who is interested in signals

For more than fifteen years this company has been prominently identified as a manufacturer of electric railway signals exclusively.

Practically the whole development of automatic signals for electric railways has taken place during this period.

Throughout this time the same management and control and engineering and policy have obtained at the U. S. E. S. Co. plant.

So that the full benefit of this engineering and manufacturing experience is applied to each signal we build—to each application we advise.

It is this stability and permanence that has enabled us to develop a nation-wide business on the sound basis of RELIABILITY in engineering — in manufacturing — in sales methods.

For our mutual benefit your business for automatic electric signals is solicited on this basis.

U.S. ELECTRIC SIGNAL CO. WEST NEWTON, MASS.

United States Electric Signal Co.

West Newton, Massachusetts

Foreign Representatives:

Quilliam Brothers, Cleggs Court, Chapel Street, Salford, England

The Convention at San Francisco

of the American Electric Railway Association

and affiliated organizations October 4 to 8, will, as in past years, be fittingly marked by the

Electric Railway Journal Annual Convention Number

To be issued September 18

Plans are in hand for making this year's issue even more than usually valuable and interesting to the industry.

The Association will, this year, provide no exhibit facilities for manufacturers. Therefore, the advertising pages of the Journal's Convention Number will take the place of the usual Convention exhibit space. Make your plans early.

Unless you have an exhibit at the Panama-Pacific Exposition, this will be your one opportunity to bring your products forcefully to the attention of Convention delegates and visitors, as well as to those railway men who do not attend the Convention.

If you have an exhibit at the Exposition, use the Annual Convention Number to feature it.

Tear off the Reminder Coupon and hand it to your stenographer now. If more convenient, sign and mail the coupon

REMINDER COUPON

Write the following letter to

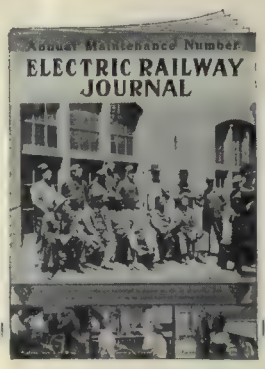
ELECTRIC RAILWAY JOURNAL, 239 West 39th Street, New York:
You may submit a suggestion for our use of the Annual Convention Number as exhibit space at this year's American Electric Railway Association Convention.

Name .....

Address .....

Signed ..... Title .....

Norfolk & Western
Electrification
-"Victor" Insulators Throughout!
Specify "VICTOR"
for Safety
The Locke Insulator Mfg. Co.
Victor, N.Y.



Your *Own*

ELECTRIC RAILWAY JOURNAL

The advantages of being a personal subscriber for the Journal are these:

You receive your own copy of the paper each week.
You have it to read when you want it and as long as you want it.
You can keep your own file of the paper for reference.

If you are **not** a regular subscriber, you probably see the Journal from time to time.

But there are times—and many of them—when you want to read the latest issue, and some one else has it.

There are many other times when you want to refer to an article in a back number, but cannot find that number.

For less than six cents a week

you can be a personal subscriber—you can get all the news of the field while it is still fresh and valuable—you can have copies when you want them.

You will never miss the subscription price, but you miss a lot of things when you do not have **your own** copy of the Journal every week.

Better send your order today before it is forgotten. Use this order form.

.....1915

ELECTRIC RAILWAY JOURNAL, 239 W. 39th St., New York.

You may send ELECTRIC RAILWAY JOURNAL beginning at once for one year to address below. I will remit subscription price of $3 within 30 days.

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POST OFFICE .....

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Some expressions of the estimate placed upon Armco American Ingot Iron by users →

Send for it—today

All Users Endorse

ARMCO AMERICAN INGOT IRON CULVERTS

which represent the triumph of modern science as applied to the corrosion problem. It has been established that iron resists rust in proportion to its **purity, evenness** and **solidity.** In these respects Armco Iron is the nearest approach to perfection which has been commercially attained.

The makers have demonstrated that corrugated culverts can be made to give service for immensely long periods. Their statements are confirmed by a multitude of satisfied users.

Write the Nearest Manufacturer for full information and prices on Armco Corrugated Culverts, Siphons, Sheets, Roofing and Formed Products.

Arkansas, Little Rock
Dixie Culvert & Metal Co.
California, Los Angeles
California Corrugated Culvert Co.
California, West Berkeley
California Corrugated Culvert Co.
Colorado, Denver
R. Hardesty Mfg. Co.
Delaware, Clayton
Delaware Metal Culvert Co.
Florida, Jacksonville
Dixie Culvert & Metal Co.
Georgia, Atlanta
Dixie Culvert & Metal Co.
Illinois, Bloomington
Illinois Corrugated Metal Co.
Indiana, Crawfordsville
W. Q. O'Neall Co.
Iowa, Des Moines
Iowa Pure Iron Culvert Co.
Iowa, Independence
Independence Culvert Co.
Kansas, Topeka
The Road Supply & Metal Co.
Kentucky, Louisville
Kentucky Culvert Co.
Louisiana, New Orleans
Dixie Culvert & Metal Co.
Maryland, Havre de Grace
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Massachusetts, Palmer
New England Metal Culvert Co.
Michigan, Bark River
Bark River Bridge & Culvert Co.
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Michigan Bridge & Pipe Co.
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Lyle Corrugated Culvert Co.
Minnesota, Lyle
Lyle Corrugated Culvert Co.
Missouri, Moberly
Corrugated Culvert Co.
Montana, Missoula
Montana Culvert Co.
Nebraska, Lincoln
Lee-Arnett Co.
Nebraska, Wahoo
Nebraska Culvert & Mfg. Co.
Nevada, Reno
Nevada Metal Mfg. Co.
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North-East Metal Culvert Co.
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Pennsylvania Metal Culvert Co.
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Pennsylvania Metal Culvert Co.
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Ohio, Middletown
The Ohio Corrugated Culvert Co.
American Rolling Mill Co.
Oklahoma, Shawnee
Dixie Culvert & Metal Co.
Oregon, Portland
Coast Culvert & Flume Co.
Pennsylvania, Warren
Pennsylvania Metal Culvert Co.
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Tennessee, Nashville
Tennessee Metal Culvert Co.
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Atlas Metal Works
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Western Metal Mfg. Co.
Texas, Houston
Lone Star Culvert Co.
Utah, Woods Cross
Utah Corrugated Culvert & Flume Co.
Virginia, Roanoke
Virginia Metal Culvert Co.
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Spokane Cor. Culvert & Tank Co.
Wisconsin, Eau Claire
Bark River Bridge & Culvert Co.

Patch Bituminous Asphalt with a KOEHRING HOT MIXER

Cuts patching costs

Write for *authoritative* figures to prove the economy

—cuts your costs way below your best possible figures in remelting and remixing by stationary plant, or having the work done under contract—and this means a cut, *not* in remelting and remixing costs *alone, but in the total cost of ripping up old material and laying new material.*

Besides think of the flexibility of this smaller unit. Haul it from job to job behind a car, use trolley power.

Give this cost-saving hot mixer a *hearing*, especially on its cost-cutting claims for patch work.

800 square yards per day, new 2 inch material.

That's what this mixer can do per day with new 2 inch bituminous material.

Also mixes concrete,—disconnection of asphalt tank and blower and connection of water tank turns it into concrete mixer with capacity of 180 square street yards *per hour.*

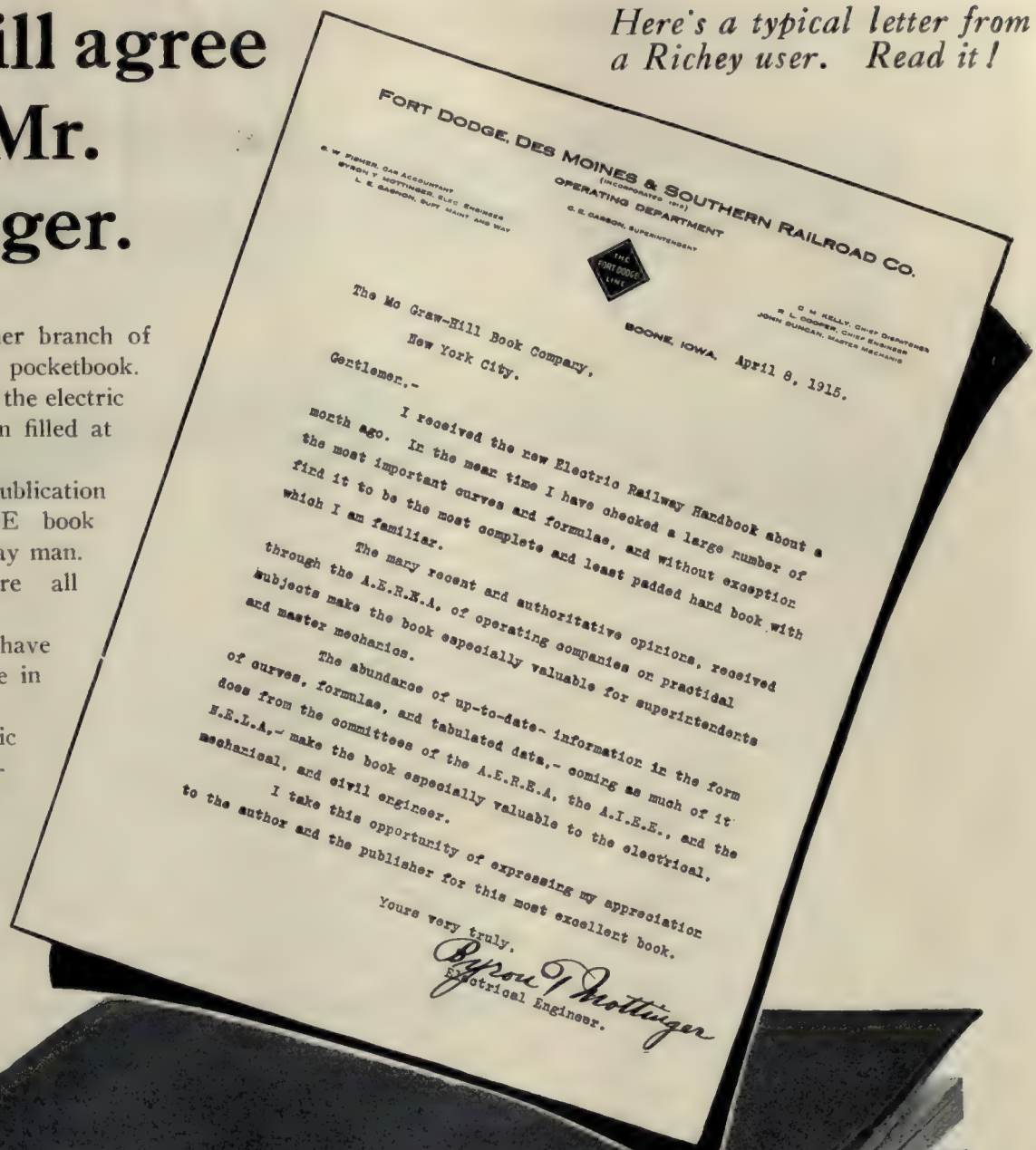
Write for cost figures of electric railways which are using this mixer—and remember, its costs-saving justifies its use even if you have a stationary plant.

KOEHRING MACHINE CO.
MILWAUKEE, WIS.

Re-melting and Re-mixing Old Asphalt

You will agree with Mr. Mottinger.

Here's a typical letter from a Richey user. Read it!



FORT DODGE, DES MOINES & SOUTHERN RAILROAD CO.
(INCORPORATED 1912)
OPERATING DEPARTMENT

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JOHN DUNCAN, MASTER MECHANIC

BOONE, IOWA, April 8, 1915.

The Mc Graw-Hill Book Company,
New York City.

Gentlemen,-

I received the new Electric Railway Handbook about a month ago. In the mean time I have checked a large number of the most important curves and formulae, and without exception find it to be the most complete and least padded hard book with which I am familiar.

The many recent and authoritative opinions, received through the A.E.R.E.A. of operating companies or practical subjects make the book especially valuable for superintendents and master mechanics.

The abundance of up-to-date- information in the form of curves, formulae, and tabulated data,- coming as much of it does from the committees of the A.E.R.E.A, the A.I.E.E., and the E.E.L.A,- make the book especially valuable to the electrical, mechanical, and civil engineer.

I take this opportunity of expressing my appreciation to the author and the publisher for this most excellent book.

Yours very truly,
Byron F. Mottinger
Electrical Engineer.

Practically every other branch of engineering has its pocketbook. The long-felt want in the electric railway field has been filled at last.

From the day of publication Richey became THE book for the electric railway man. The reviewers were all enthusiastic.

Hundreds of users have voiced their gratitude in testimonial letters.

We want every electric railway man to examine a copy on our free examination offer. There is no obligation to keep the book.

By **Albert S. Richey,** Electric Railway Engineer, Professor of Electric Railway Engineering, Worcester Polytechnic Institute. 830 pages, over 600 illustrations; leather pocket size, full gilt, $4.00 (English price, 17s), net postpaid.

McGraw-Hill Book Co., Inc.

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Publishers of Books for Electric Railway Journal

Free Examination Coupon

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You may send me on 10 days' approval:
Richey—Electric Railway Handbook, $4.00 net.
I agree to pay for the book or return it postpaid within 10 days of receipt.
— — I am a regular subscriber to the Electric Railway Journal.
— — I am a member of A. I. E. E.

(Signed).....

(Address).....

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Reference .....E 6-12
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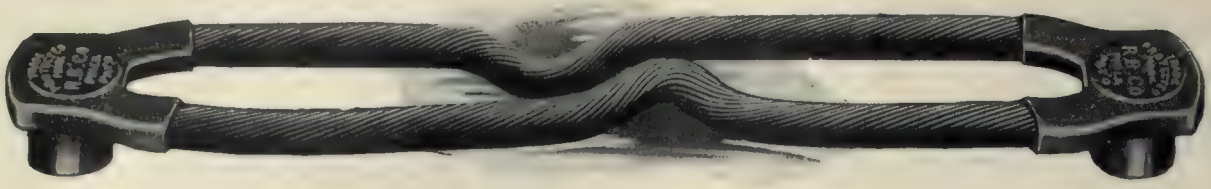


Type F C Bond

Type P-4-P Bond

"Protected" Rail Bonds for Big Electrifications

The Chicago, Milwaukee & St. Paul Ry.,

now electrifying a portion of its system, has placed with us orders for

25,000 "Protected" Rail Bonds

for this work. These are type P-4-P bonds, 250,000 circular mils capacity. 37 inches long.

Isn't this order ample proof of the merits of this bond? But do you want **further reasons** why **you** should specify and use them?

Use them because of their soft, ductile terminals that will stand heavy compression without cracking. Use them because of the flexibility given them by the use of pure lake copper in the bond body; flexibility that reduces breakage to a minimum.

Use them because of their "Shot-Over" sleeves—a protecting sleeve around the strands at their point of emergence from the terminal; providing at this point, where vibration is most severe, new, live, unburnt, mechanically protected copper to absorb it.

Use them for these reasons and more; **and remember that the proof of their service lies in the more than 18 years' experience behind them and in the over 8,000,000 now in service.**

Wouldn't our broad experience in connection with every class and kind of rail bonding problem be of great value to you right now? It is yours for the asking, without the slightest obligation on your part.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA	NEW YORK	CHICAGO
17th and Cambria Sts.	Hudson Terminal	417 So. Dearborn St.

Joint Announcement

WE beg to advise that the Sauvage-Ward Brake Company, Inc., has the exclusive and irrevocable right under Sauvage United States Patents Nos. 1,117,707 and 1,124,813, as well as under United States Patent No. 1,020,519 to the extent of the right heretofore owned by the Sauvage-Ward Brake Company, Inc., the Sauvage Appliance Co. or William H. Sauvage, to manufacture and sell and license others to manufacture and sell Automatic Brake Slack Adjusters of the Shim type, such as the Sauvage-Ward Brake Company, Inc., has heretofore marketed and advertised for electric street railways, urban and interurban, including subway and elevated lines, the said right being held free of interference from the Sauvage Appliance Co. or William H. Sauvage on account of any patents now owned or hereafter acquired by them.

The Sauvage Appliance Co. has the same exclusive and irrevocable right with respect to steam railroads and the electric divisions of steam railroads.

Sauvage-Ward Brake Co., Inc.
By WM. SEBERT SCOTT
President
17 Battery Place
New York, N. Y.

Sauvage Appliance Co., Inc.
By W. H. SAUVAGE
President
51 East 42d Street
New York, N. Y.

Car Supplies

Parts for Cars of Any Date

With some kinds of supplies a little delay doesn't matter much—not so with truck supplies and parts for cars.

We always put ourselves in the customer's place when we receive a "Rush Order" for anything in this line, because we realize what a loss is often occasioned when rolling stock is "tied up." Railway men have learned to depend upon our

"Hair Trigger Service"

It is always *prompt* and always *dependable.* The reason is obvious—we want your good will—want your *future* orders as well as *present.*

And don't forget this—we can supply you with parts for cars *of any date.*

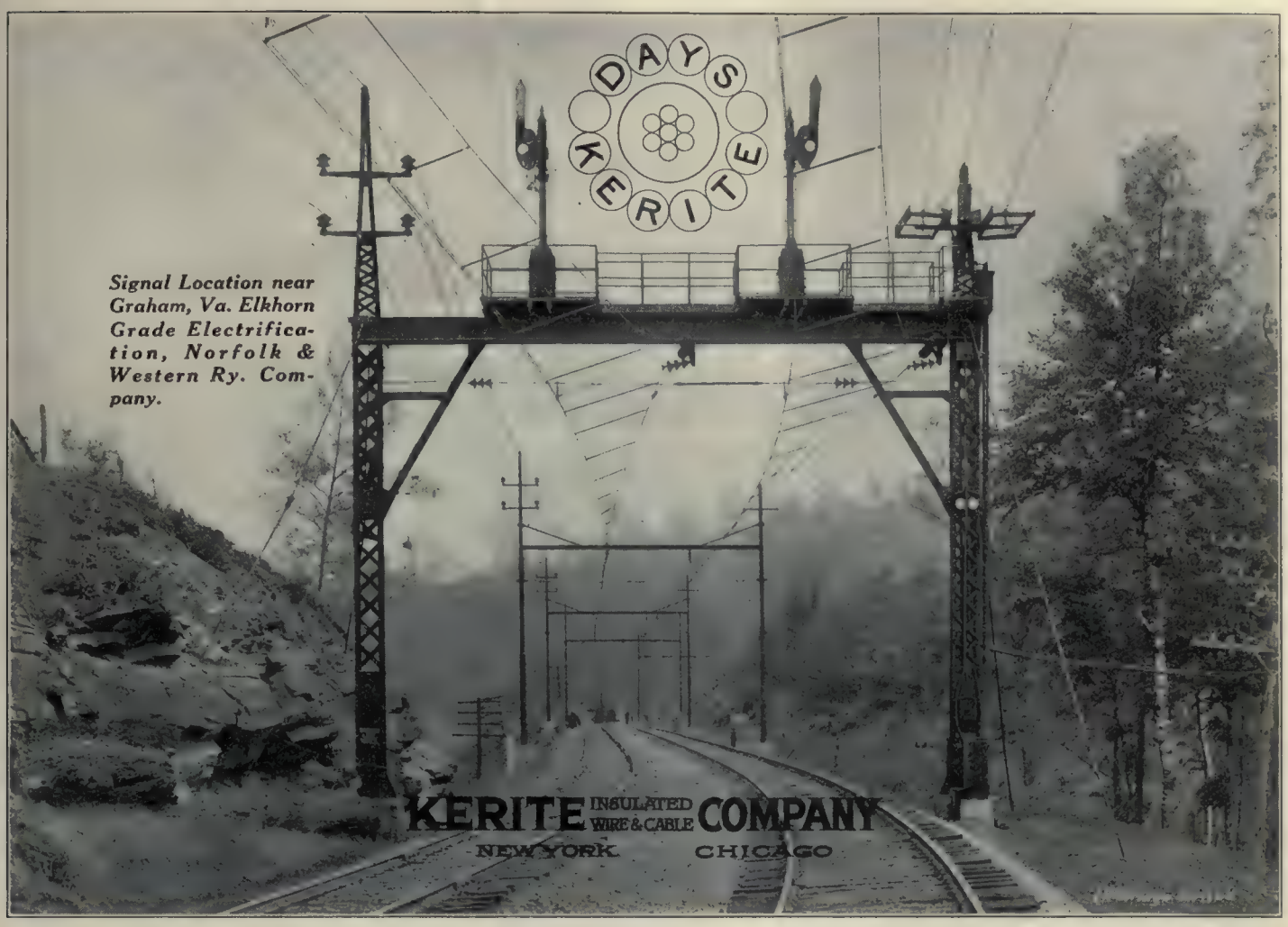
Think what such service means to you.

ST. LOUIS CAR COMPANY, St. Louis

Electric and Steam Railway Coaches, Steel Cars, Trucks and Journal Bearings, Curtains, Seats, Rattan, Bronze Trimmings, Miscellaneous Car Supplies.

Eastern Representative:
WENDELL & MACDUFFIE CO.
61 Broadway, NEW YORK

Pacific Coast Representative:
GUS KOCH
797 Monadnock Bldg., SAN FRANCISCO



Signal Location near Graham, Va. Elkhorn Grade Electrification, Norfolk & Western Ry. Company.

Telephone Train Dispatching
with

Western Electric

Selector and Telephone Apparatus

combines the safety and efficiency of the telephone system of directing train movements with the reliability and efficiency of Western Electric apparatus. Selector and telephone apparatus is designed and manufactured to give a maximum of service with a minimum of maintenance.

Discuss your problems with us

Western Electric Company

Manufacturers of the 8,000,000 "Bell" Telephones

New York, Buffalo, Philadelphia, Boston, Pittsburgh, Atlanta, Richmond, Savannah, New Orleans, Houston, Chicago, Milwaukee, Indianapolis, Cleveland, Cincinnati, Kansas City, Omaha, Oklahoma City, Minneapolis, St. Paul, San Francisco, Oakland, Los Angeles, Seattle, Portland, St. Louis, Dallas, Denver, Salt Lake City

EQUIPMENT FOR EVERY ELECTRICAL NEED

Member Society for Electrical Development "Do it Electrically"

Write for further details

High Vacuum at Low Cost

With low steam pressure —
With no cost of maintenance

THE SPRAY SYSTEM

Write for all the facts

THE picture shown here gives the Spray System used by the electrified division of the Norfolk and Western. As in the case of more than 250 other power houses, it was found more economical to install the Spray System than to build a cooling tower, and it cost practically nothing to maintain it. Only a small pond is required and six pounds pressure will give a vacuum of 28½ inches and take care of 4000 H.P. engines.

Spray Engineering Company
93 Federal Street Boston, Mass.

Economical Construction

Diamond Tapered Steel Poles

are economical in first cost and also give the economy of permanent construction.
They are built of two tapering troughs, giving the finished pole a square cross-section like the trade-mark cut.
This construction gives the greatest strength with the least possible weight.

The poles, while flexible under heavy stresses, do not take a permanent set.
Joints are longitudinal to conserve the full strength of the metal and are watertight.
You will find Diamond Tapered Steel Poles decidedly economical.
Write us for data.

Diamond Steel Pole Co., Philadelphia, Pa.

3221

No. 10

Engineer of Way of one of the Country's noted street railways

Compare This Opinion From "Your Side of the Fence" with Your Track-Grinding Results

"We have saved the relaying of 15 blocks of double track by the use of the grinder alone. During the season it has ground joints on about 8 miles of single track, working the machine sometimes continuously both day and night."

Two facts stand out here—the avoidance of track-relaying with attendant cost and schedule interference; and the continuity of work which the portability of the Reciprocating Grinder makes possible.

Important economies **always** follow its use.

Railway Track-work Co., Heed Bldg., Philadelphia

CARNEGIE STEEL COMPANY

General Offices—Pittsburgh, Pa.

STEEL TIES

We manufacture steel cross ties and fastenings suitable for every kind of service.

Our heavy sections are used by steam and traction roads under most exacting conditions.

Our lighter sections are especially adapted for use in mine and portable track.

When you are in the market let us figure with you on your requirements.

DISTRICT SALES OFFICES:

Birmingham, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, New Orleans, New York, Philadelphia, Pittsburgh, St. Louis, St. Paul

United States Steel Products Company—Pacific Coast Departments:
Los Angeles, San Francisco, Portland, Seattle

Export Representatives:
United States Steel Products Company, New York, N. Y.

What you get out of *your* Electric Railway Journal

depends upon the time and thought you put into the reading of it.

Thought, time, energy and money are expended in abundance to make each issue of maximum value to the greatest possible number of readers. You benefit by this expenditure in direct proportion to the attention which you give to your paper.

A mind alert for suggestions will find in every issue food for thought and help in its daily tasks. This applies to the reading of the advertising pages, as well as to the reading of the text.

Remember that electric railway progress is due as much to the efforts of the engineers engaged in developing new equipment for manufacturers as to those who buy and use what these manufacturers tell about in their advertisements.

These engineers who give their talents to the manufacturing branch of the industry are always ready to give the benefit of their study and experience to their fellows in the field. An inquiry addressed to the advertiser is usually all that is required. It will receive prompt attention whether or not you are in the class of potential buyer at the time.

Advertisers know the advantage of giving full and reliable information to everybody in the field who indicates his interest in anything relating to the advertised product.

Make the Most of It

"Stop it" No. 12

Stop putting a heavy tax on each of your new cars by trying to save a few dollars on first cost.

Get Peacock Improved into the specification—they cost very little more than even the old staff brake and will quickly pay for themselves.

Then you'll have a brake you can **use** instead of one you **can't** use.

You'll have a brake that enables the motormen to make quicker stops with less effort —that materially reduces accidents and damage claims—that saves power and brake shoes.

Records prove it.

Ask to see them.

National Brake Co.

888-890 Ellicott Square, Buffalo

Installing G-E Line Material on the Chicago, Milwaukee and St. Paul.

The Big St. Paul Electrification

The work of installing G-E Catenary line material on the first section of the big electrification project of the Chicago, Milwaukee & St. Paul will soon be completed.

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MASTER MECHANICS ELECTRICAL COMMITTEE

The dominant note in the report made by the committee on maintenance of electrical equipment before the Master Mechanics' Association this week was clearly reassuring to the mechanical men who were advised that they would float rather than sink in the rising tide of electrification. That no insoluble problem for the steam-railroad official exists in the change from steam to electricity, in fact, is borne out by the success of the individual members of the committee with electrical operation, because the majority of them were trained only in the school of steam. Primarily, there is no important difference in the shop equipment used for repairing locomotives of the two types, and the common difference in organization, which is based on the greater difficulty in finding defects in electrical equipment and the correspondingly greater ease of remedying them is by no means essential. This, at least, has been demonstrated by the policy of the committee's chairman, C. H. Quereau, as he has followed the steam-railroad practice of eliminating, as far as possible, separate forces for inspection and repairs, at the same time keeping up for nine years on the New York Central Railroad the remarkable maintenance figure of 3½ cents per engine mile. Even in the field of operation, electrification can bring no difficulty for the mechanical department heads, for steam engineers can get along perfectly well with electric equipment, and there is no necessity for breaking-in new enginemen. Indeed, the committee points out that the major part of the alleged extensive knowledge of locomotive engineers pertains to other matters than locomotives, and to anyone who has had dealings with them, this is a most conservative statement.

STANDARDIZE EQUIPMENT-FAILURE RECORDS

One very important point brought out in the report was the recommendation to adopt the unit, "miles per detention," as a standard basis for equipment failure records. For years the reliability of the steam locomotive has been judged solely by its record of engine failures which, on a mileage basis, is exactly the unit advocated by the committee. But with the introduction of electricity, which thus far has been confined largely to passenger service, this fact has apparently been overlooked, and electrical reliability records have been frequently based upon "miles per minute of detention," a unit that has been brought into use through its convenience rather than its intelligibility. Of course, the latter unit best serves the needs of the transportation department as a purely operating record, and it has to be made up in any event. This does not, however, entitle it to be imposed upon the mechanical department, whose interest is confined to the attainment only of an ideal wherein the rolling equipment never breaks down. Once a failure of some locomotive part has occurred, the question whether it has caused a delay of five minutes or fifty minutes is not even of academic interest to the officials in charge of maintenance. What they need to know is that the failure occurred and the cause, and the actual number of detentions due to the equipment is what they should be charged with regardless of the lengths of the delays. As the committee suggests, it would be well to standardize this unit now, rather than to wait until the growing use of electricity for mixed traffic renders the time element in detention records altogether abortive.

HUMAN NATURE AND THE RAILROAD

A book with this title written by Ivy L. Lee, formerly executive assistant Pennsylvania Railroad and now a member of the staff of John D. Rockefeller, has recently been issued by a firm of Philadelphia publishers. Mr. Lee begins with the thesis that the railroad problem is after all a human problem. It is built by human beings, run by human beings, regulated by beings who are very human and serves human beings. The great problem is to make the railroad manager, the employee and the public, in their mutual relations, understand one another's point of view. To help get this mutual understanding, Mr. Lee gives some very simple arguments and illustrations. To illustrate the rate question, for example, he compares it to that of a hotel built in a rapidly growing city like, say, Indianapolis. Originally, the hotel was designed so that each room would contain only a bed, a washstand and a dresser, and the price of the room is assumed to have been restricted to, say, $2 a day. Later, laws were enacted providing that the hotel should gradually be made fireproof, that a bathroom should be added to every room, that there should be elevators, more attendants, that every guest should be supplied with a drinking cup, and other facilities should be added by law so that the hotel should be more comfortable. During this time, however, Mr. Lee assumes that the public insists that the price of the room should remain at $2 a day. How many people, he then asks, could be induced to engage in the financing of future hotels under conditions of this kind. This practically represents the situation of electric railway companies at the present day. Additions in the way of greater facilities and longer rides have been made at the demand of the public and by the requirements of commissions, but the public insists that the 5-cent fare must remain in force.

THE ERIE CAR

The all-steel car, described elsewhere in this issue, that has been designed by the firm of L. B. Stillwell for the Erie Railroad, possesses features worthy of note, not so much because of their spectacular character but rather because of their simplicity. In effect the car body is nothing but a long box with all the advantages of transverse and vertical strength that accompany a box-construction. Members which do not contribute to that general idea have been rigidly excluded. This characteristic is best emphasized, perhaps, by referring to the omission of belt rails from the side framing, because a car without belt rails, according to practically universal custom in car design, seems to be very much like a ship without a rudder. As a matter of fact, however, if one were not so used to seeing this member in car construction its retention would be the surprising matter rather than its omission, because, when full advantage is taken of the weight-supporting qualities of the car side, it must lie close to the neutral axis of the beam and thus become practically ineffective.

Judged by the standards of the average interurban railroad the weight of the car body is not exceptionally low. The reason for this is a definite one, however, and is obvious enough when the strength of the construction is considered. Its ability to resist buffing and pulling strains has an ultimate calculable value approximating 1,200,000 lb., the center sills, whose sole duty is to resist these forces and not to carry weight, being prevented from springing either vertically or horizontally by cross-bearers from the side framing. The floor is, in fact, constructed to act as one side of the box-construction that applies to the car body as a whole, and the same thing is true of the roof. Sufficient strength is incorporated in the latter so that the car can be turned upside down and supported on the roof without serious damage. It is designed even to withstand the shocks incident to rolling over, when the entire weight would be imposed upon the line of the eaves, the side posts being bent over into heavy knees at their tops and connected by a continuous deck sill. This forms the equivalent of a flange for the exaggerated girder made up by the car side. In general, the car body members are designed for the equivalent of 13,000-lb. fiber stress, and the car is capable of supporting itself without serious overstrain even when carried at the extreme ends with the trucks removed.

Although the car is to be used for the present, at least, in steam-operated trains, it has been designed throughout with a view to its ultimate equipment with motors and control for multiple-unit operation, and this feature is very significant. At the same time it is a most important consideration for steam railroads, because whether such roads are electrified or not, provision for electrical equipment on passenger cars can be easily made and involves practically no additional expense at the time of reconstruction. If there is no such provision, however, the introduction of electricity means the purchase of new cars and trucks or else expensive reconstruction of existing equipment.

"SAFETY FIRST" NOT A CUT-AND-DRIED PROGRAM

Despite the progress of the past two years in safeguarding the power plant, we are not likely to see the time when a complete recipe for eliminating the danger points can be written with universal applicability. There will always be room for intelligent study of local conditions, although in dealing with many kinds of equipment certain safeguards worth while in one installation will be found equally useful in another.

The installation of guards about gearing and belts, the use of extension pieces on galleries to prevent the dropping of tools and loose metal on the heads of operators, the placarding of high-tension wiring and dangerous contacts, the adequate railing-in of machinery, the protection of switch cells, etc., are methods that may now be said to be of general application, but in practically every station a safety survey goes farther than this. Differences in station design alter clearances and change dimensions of passageways; they necessitate the relocation of piping and valves in extensions, perhaps, or they involve difficulties of access which in themselves tend to cause trouble in emergencies. Just as each plant has individual characteristics, so the acute study of its accident possibilities reveals special hazards which may not be present in a neighboring installation. The ability to see these hazards by imaginative analysis is therefore a very important factor in the protection of the equipment and its operators.

If the safety movement were confined exclusively to the use of standard methods of protection, it might easily become a good deal of a bore to the engineer. There is danger of multiplying safety "standards," so-called, which should never be allowed to take the place of the best solution of the problem in each local case. Something can safely be allowed for the adaptability of mankind. If the safety movement were carried to the extremes sometimes advocated, we should always have the same height of risers and width of treads in stairways; ladders would be affixed to a stated maximum angle with the floor, and clearances would become uniform to the extent of giving the station operator too much room in some cases and perhaps too little in others. This does not mean that consideration should not be given to all the well-known normal methods of safeguarding equipment, but it does signify that there is still ample space for the exercise of originality in discovering possible dangers and in avoiding their occurrence.

In work of this kind more attention is going to be given in the future to the location of auxiliary apparatus of various kinds. It is far better to put the station power and lighting transformers, for instance, on a gallery behind a railed-in space which can be reached without passing in close proximity to high-voltage circuits than to put them into a cramped location near a bank of lightning arresters against which one easily may lean in opening a disconnecting switch or in replacing a fuse. It all goes back to the perennial problem of anticipating the needs of the operating man when working on the embryonic plans of the station,

and the safety movement has its place in the mind of the power-station draftsman of the first order no less than it has its proper hold upon the attention of the man responsible for the productive service.

MORE NOTES ON REGENERATIVE BRAKING

In the issue of the ELECTRIC RAILWAY JOURNAL for May 15 attention was directed by the editors to certain features of regenerative braking. The live character of the subject is indicated by the fact that even while the paper was in press A. H. Armstrong was explaining the application of the principles of regenerative braking in the Chicago, Milwaukee & St. Paul electrification at the A. S. M. E. meeting in Chicago. In last week's issue a letter from Frank J. Sprague, one of the pioneers in electric traction referred to in the last editorial, was printed. There were also articles describing the electric locomotive equipment of the Norfolk & Western and that under construction for the Chicago, Milwaukee & St. Paul Railway. This general revival of interest is, of course, due to the electrification of important divisions of these railways on both of which very heavy trains are to be braked.

There seems to be some confusion as to the advantages and disadvantages of regenerative braking, the point of view being determined more or less by the experience and interest of the person holding it, as well as upon the conditions under which it is applied. In one case it is principally the energy saving which counts, in another it may be the reduction in power house cost, in another ease of control and in a fourth reduction in risk of wheel breakage and brakeshoe saving, while in other cases complication in control equipment and increase in motor capacity appear to be of overwhelming disadvantage. It may therefore be worth while to summarize the situation briefly, merely touching upon the points developed in the last editorial.

Energy saving is an attractive proposition as is indicated in Mr. Armstrong's statement on page 1073 of last week's issue to the effect that, on a 2 per cent downgrade, 55 per cent of the up-grade power consumption can be restored to the line. The average saving, even on a system having considerable 2 per cent grade, is very much smaller than this. It is worth while, however, especially if the energy is purchased from a power transmission company, but the principal result is likely to be in the reduction in service charge in the case of purchased power or its equivalent power house investment cost where power is generated by the railway. In the latter case, as previously stated, the kw-hour element of the cost may be negligible due to excess of supply of water power. The conditions cited apply principally in electrifications where considerable density of traffic is involved. There are undoubtedly other circumstances under which the whole matter of energy saving may be of negligible moment.

The advantages of regeneration from braking considerations come principally in the reduction in risk of injury to the wheel flange or to the whole tire. While, as was pointed out in the editorial referred to, it may not always be possible to demonstrate a direct money saving in brakeshoes, wheels and track sufficient to warrant the complication of regenerative braking, yet, during long periods of heavy mechanical braking the concentration of heat on wheel treads and flanges may produce serious results, due to internal stresses developed, and it is even possible that tires may be loosened and flanges broken. In this connection a former superintendent of motive power of a large steam railroad recently said that under these conditions of continued mechanical braking he had seen the paper centers of Pullman carwheels charred for a depth of 2 in. under the tires, indicating a violent overheating. This condition has undoubtedly been very influential in forcing the development of electrical regeneration.

The objections to regeneration are really not serious when conditions otherwise warrant its use. The induction motor is a natural generator when polyphase excitation is furnished, with or without the phase converter. Its constant-speed characteristics are not insuperably objectionable in the only class of service in which regeneration is practicable. The series motor can be made into a good generator by the plan suggested by Mr. Sprague, or its equivalent, without unwarranted complication. The General Electric Company has actually undertaken to build regenerating d.c. locomotives on a large scale. And the motor-heating item is not so serious either under mountain-grade conditions for this reason. Hauling heavy freight trains up long grades at slow speed involves a considerable time element, in some possible future electrification several hours. The motors have time to attain nearly steady temperature, which motors with forced ventilation do very quickly. This is evident from the data, given last week by Mr. Armstrong, showing that the motors for the C., M. & St. P. locomotive have a continuous rating only 12½ per cent less than the one-hour rating. The operating conditions here are radically different from those where intermittent load is carried by non-ventilated motors. Under the latter conditions, as was pointed out in the editorial four weeks ago, electric braking, regenerative or otherwise, means larger motors. If all the motors are used in braking, the load on them is less than the climbing load by twice the friction load, and the heating is more than proportionately less. Hence a motor that is not overloaded on an up-grade sufficiently long to bring it to steady temperature will not, by a large margin, be overloaded in holding the same train on a down-grade of the same percentage. It follows, then, that less than the total number of motors can be used in braking without overloading by the proportion which twice the train resistance bears to the up-grade load. On the Norfolk & Western, one-half the motors only are used on the down grades.

Whichever main advantage of regeneration, better braking or energy saving, weighs more in the minds of the officials responsible for the choice of electrification systems, they all agree that regeneration should be used when heavy grades are involved.

All-Steel Cars for Erie Railroad

New 44-Ton Cars 72 Ft. Overall Have Been Placed in Steam-Operated Suburban Service on This Line, the Design Providing for Future Installation of Electric Motive Power Equipment Although the Strength of Structure Has Been Based Upon the Heaviest Steam-Railroad Standards

There have just been placed in suburban service by the Erie Railroad several all-steel passenger cars which possess unusual qualifications of structural strength combined with moderate weight. The design, in fact, provides for shocks due to derailment and overturning as well as collisions without distortion of the primary structure. The weight complete with trucks and car-body equipment, but without motors or the storage-battery lighting outfit at present installed, is 87,400 lb. This is approximately 8 per cent lighter than the class of steel-underframe cars that preceded the new cars, although the former have materially less ability to withstand abnormal strains.

For the present, of course, the new cars are to be operated as trail cars drawn by steam locomotives, but the Erie Railroad, in common with the Pennsylvania, is providing for future electrification by so planning the new cars that they may be equipped with motors and electric control at any time without necessity for replacing any of the material or altering the arrangement in any way. The wheels and axles, of course, are designed especially for trailer service, but the trucks are arranged so that these can be replaced by larger wheels and axles that are suitable for a geared drive. In addition, space has been left so that inside-hung motors may be set in between the axles and the transoms, the latter being specially designed for the support of the motor nose.

Provision for installing switches and control equipment has been made in the vestibule sheathing at each end of the car and certain of the floor members have been installed with sufficient reserve strength to carry the switch group, resistance, compressor, blower, transformer and other apparatus that might be installed under the floor when the cars are equipped for electric operation. Over each truck the car roof has been given ample strength to carry pantographs or similar current-collecting devices, and the height of the roof has been made suitable for this purpose. All of these provisions have been designed with a view to the establishment of the most advantageous facilities for electrical operation, and, in addition, special consideration has been given to the questions of thorough inspection methods and easy accessibility for maintenance. However, the suitability of the car for operation in steam-train service has been in no way impaired.

General Features

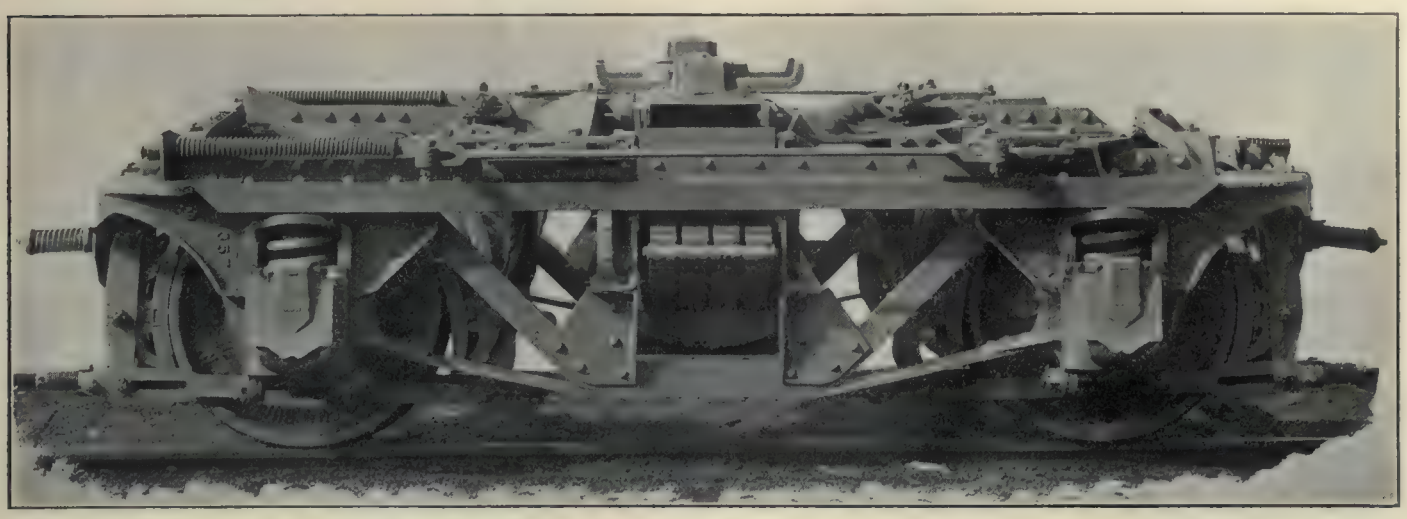
The general features of this car were selected by F. D. Underwood, president Erie Railroad, and the car was designed under the direct supervision of William Schlafge, general mechanical superintendent of that system, by the firm of L. B. Stillwell, consulting engineers. Throughout the design the following characteristics were kept in mind as essential: Safety and comfort of passengers; low cost of operation; low cost of maintenance; moderate first cost.

The feature of safety of passengers was covered by a special study of the behavior of railroad cars when subjected to the stress of derailments and collisions, and is secured by surrounding the passenger-carrying space with heavy, shock-resisting members, the superstructure being an integral part of the car and providing the equivalent of a solid box construction. Not only is the floor construction of ample strength, but the members forming the side walls are so disposed as to resist collapse or telescoping even should the car be overturned. The form of roof also adds greatly to this protective feature, as the side posts are bent at the top to form heavy knees and connected by a continuous deck sill made of 5-in. x 3/16-in. plate. This construction serves in effect as a flange for the high girder that is formed by the side of the car.

The vestibule end posts consist of 9-in. I-beams framed into the sills and to the vestibule ceiling construction. The body and walls or bulkheads are fitted with ¼-in. pressed-steel corner posts 12 in. deep, and gusset connections of ¼-in. flanged form extend from the bulkheads to the side sills and to the top plates, thus bracing the end walls against collapse in case of a heavy blow.

Comfort of passengers is contributed to by a special truck construction to give easy riding qualities, by the design of the seats and by the lighting arrangement, which avoids the use of large units that concentrate centers of intense light at several points. Instead, the reflection from the ceiling is used to effect thorough diffusion.

ERIE CAR—VIEW OF FULLY EQUIPPED CAR



ERIE CAR—NON-EQUALIZED TRUCK WITH CLASP BRAKES

CAR WEIGHTS

The cost of operation of any car involves the factor of dead weight as related to seating capacity. The results secured in this case, as indicated in the accompanying table of comparative weights, show that the all-steel car weighs less per seated passenger, and closely approximates the weight per foot of overall length, when compared with the lightest wooden car in the same company's service:

TABLE I.—COMPARISON OF WEIGHTS OF NEW AND OLD PASSENGER CARS OF ERIE RAILROAD

	All Steel	Steel Under-frame	Steel Under-frame	All Wood	All Wood
Number of seats...	86	72	72	72	72
Average weight, lb.	95,400	96,500	100,500	83,200	86,600
Weight per seated passenger, lbs...	1,100	1,340	1,400	1,140	1,200
Weight of lighting equipment, lb....	St. Bat. 8,000	St. Bat. 8,000	St. Bat. 8,000	Gas 2,000	Axle Gen. 6,500
Net weight ex. lighting equipt.	87,400	88,500	92,500	81,200	80,100
Weight per seated passenger, exclusive of lighting equipment	1,017	1,230	1,284	1,128	1,112
Length overall.....	70' 4"	66' 3½"	66' 3½"	66' 3½"	66' 3½"
Weight per ft. ex. of lighting equip....	1,243	1,333	1,395	1,225	1,210

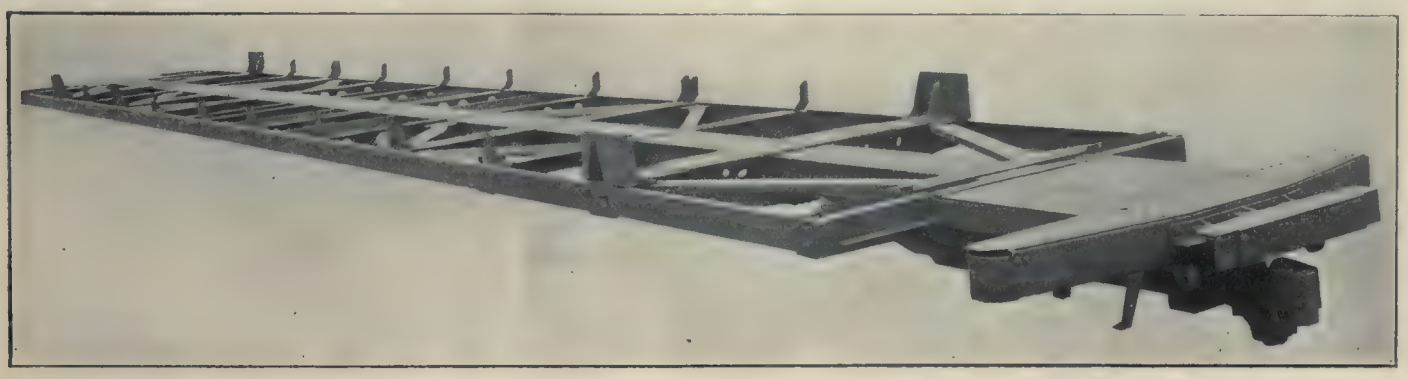
The comparison per foot of overall length is especially interesting, as it is unaffected by the seat spacing. It should be said also that the new cars are fitted with heavy friction buffing devices and friction draft gear, as well as large draft sills, whereas the lightest wooden car has only the spring platforms and wooden draft sills with tandem spring draft gear customary with cars of that type.

The lighter weight of the new car, as compared to other steel cars in similar service, can be attributed to the system of design orginally developed by L. B. Stillwell and Frank M. Brinckerhoff for the Hudson & Manhattan Railroad and the New York, Westchester & Boston Railway. This system involves the rigorous exclusion of all unnecessary members and also the co-ordination of all members that are installed so as to develop their full structural value. The uneconomical and heavy center-sill construction of the fish-belly type has been eliminated, and a center sill of uniform section whose sole function is to absorb buffing and pulling strains extends from end to end of car. In order to develop the full strength of the center sill as a column it is supported from the deep side-frame by cross bearers at each main side post, these being on approximately 65-in. centers.

RIGIDITY OF STRUCTURE

The cost of maintenance of all-steel cars is a matter regarding which few data are yet available, and the influence of structural strength upon the rate of deterioration is a question that will require time before it can be definitely answered. However, it is obvious that the maintenance of a rigid structure will be less than that involved by one in which even slight flexure occurs at the joints. This principle has been followed in the new design by making the girder or truss that supports the load extend over the entire height of the car side.

No belt rail, in fact, has been included in the design, because the side structure of the car is composed of a series of T-shaped pressings with diagonal braces at the bottom, such as are shown by the accompanying line cut. These make up the complete supporting frame work. The sheathing serves only to house the interior of the car, and it is made up from 1/16-in. sheets of American ingot iron, this metal being chosen in preference to steel on account of its rust-resisting qualities when rolled in thin sheets. The sash rests are supported directly by the side posts, being welded to them to secure waterproof joints.



ERIE CAR—VIEW SHOWING LIGHT FLOOR FRAMING AND CENTER-SILL CONSTRUCTION

ERIE CAR—INTERIOR VIEW

As a result of this construction the truss-side of the car is 7 ft. 5 in. high, or about two-and-one-half times the height of girder that is possible in the type of construction where a heavy belt rail at the window sills serves as the compression member. As deflection varies with the cube of girder height while strength varies only with the square of the height, it is manifest that the rigidity of the structure for the cars in question is more than two-and-one-half times as great as it would have been with equal strength had the side-girder been limited to the height between the window sills and side sills.

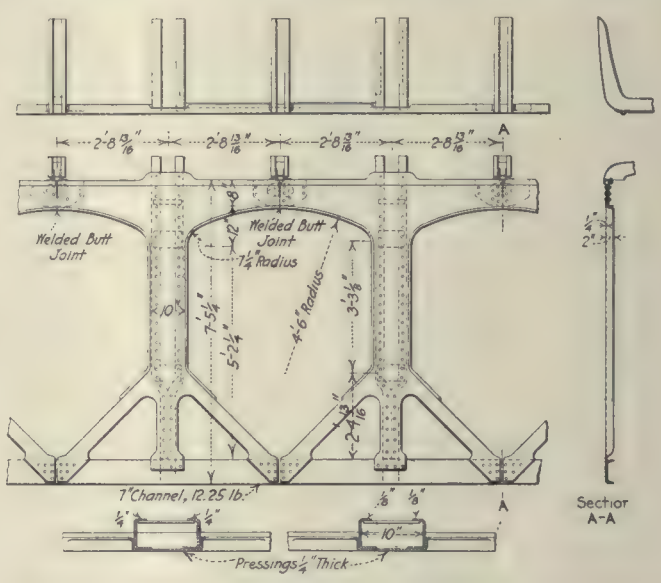
In comparison with the underframe type of construction where there is no side girder at all, the rigidity of the new car is actually some seven times greater even with cars of equal strength. Naturally, the limitation of the deflection decreases the tendency for spring in the joints in the roof and between the top plate and side posts and, in turn, decreases the opportunity for overstraining riveted joints and having them work loose.

ERIE CAR—FRAMEWORK OF CAR PRIOR TO APPLICATION OF SHEATHING

The cost of car structures bears a general and approximately fixed relation to weight, and consequently, unless unusual refinements of workmanship are involved, reduction in weight means reduction of first cost. That this feature has been given consideration in the new design has been shown in the foregoing table. In general, it may fairly be assumed that a reduction of 1 lb. in weight of car will effect a saving of 10 cents in first cost.

As the rigidity of an all-steel car underframe makes the use of a friction draft gear practically imperative and the installation of an effective buffing device equally necessary, the new cars are fitted with equipment of this type that has sufficient capacity to absorb the most severe shocks that may be expected in service. The general design of the center sills is based upon an ability to absorb an ultimate force of 400,000 lb. at 18,000 lb. fiber stress.

The center sill construction forward of the bolsters is supported by the high side frames through the body and sill and bulkhead construction. The bending moment occurring at this point due to the eccentric draft gear forces is resisted by deep pressed-steel draft sills extending through the bolsters and is transferred by the body and sill and bulkhead construction to the high side frames. The center sills between bolsters are thus relieved of any eccentric loading from the draft gear, and the full section is available to resist the consequent direct compression because the sills are supported and aligned by the high side frames and heavy cross bearers as previously mentioned.



ERIE CAR—PRESSED-STEEL UNITS FORMING SIDE FRAME

DETAILS OF CONSTRUCTION

The center sills between bolsters consist of two 8-in. 16.25-lb. channels, spaced 14 in. back to back, with a 19 in. x ⅜ in. top cover plate and two 4-in. x 3½-in. x ⅜-in. angles reinforcing the bottom flanges. This gives a total section of 22 sq. in. Forward of the bolsters the pressed-steel draft sills reinforce the center sill construction and at the point of maximum depth add 10 sq. in. to the section.

The side frames of the car which are 7 ft. 5¼ in. from bottom of sill to top of side plate are designed like a bridge girder, with a pressed-steel compression

member at the top plate and a channel tension member at the side sill. The posts connecting these members are of 10 in. pressed channel form, ¼ in. in thickness. The posts are furnished with integral diagonal braces below the windows and with flanged gussets at portal arches. They are reinforced with other pressings to form a box shape, the thickness increasing from ⅛ in. to ¼ in. at the posts which are subject to the greater horizontal shear. At the point of maximum shear the post is further reinforced by 2-in. x 3/16-in. angles inside of two corners of the box post, the shearing force here being 11,000 lb. on the one post. The maximum stress assumed in the design of these side frames was 16,000 lb. per sq. in. This stress is based upon the moment established by the total dead weight of the car resting on the center plates, plus the maximum load of passengers that could stand in the car, and with 25 per cent of the total dead load and live load superimposed in addition. Under these conditions, also, the stress in the bolsters is maintained at 12,000 lb. and that in the truck frame, which is not spring supported, at 8000 lb. The sides of the car, as previously described, are provided with transverse strength by bending over the tops of the posts to form a sort of flange. This has an estimated ability to withstand the strains imposed by the car rolling over side wise, thus loading the eaves on one side with the entire weight of the car.

The roof structure is formed of pressed channel carlines and is of the compound arch type. This outline of roof is not only strong, light and inexpensive, but gives good ventilation, good distribution of reflected light and is particularly suitable for the support of electric current collectors on cars fitted with electrical motive equipment. The roof sheathing like the side sheathing is made of 1/16-in. non-corrodible American ingot iron. The joints are riveted and flame-welded.

The trucks of the new cars are of the non-equalized type and are fitted with spiral journal-box springs and 38-in., quadruple, elliptic springs. The proportioning of the springs is such as to produce the easy-riding qualities so essential in steel car construction, not only for the comfort of the passsengers but for maintenance of equipment and roadbed. The trucks, complete with clasp brakes and 33 in. wheels with 5 in. x 9 in. journals, weigh 12,500 lb. each. A feature of interest on the trucks are Coleman bolster-locking center pins which prevent the separation of car body from truck in case of derailment or collision and thus aid in preventing telescoping of the cars.

Illumination of the cars is secured by eleven electric fixtures arranged in the center line of car. The form of ceiling outline is such as to reflect and distribute the light evenly over the seats and aisle without producing shadows. One 25-watt lamp is used in each fixture. The cars are equipped with Wilson storage batteries of 800 amp hour capacity.

The interior sheathing is of fire-resisting Agasote throughout. The insulation of the car is made up of ¾-in. Flaxlinum fastened to the outside sheathing by pins that are spot welded to the frame, and bent over washers that hold the insulating material in place. In all cases the railway company's standard parts have been incorporated in the construction, so that wherever renewals are involved stock material will be available in the company's store rooms.

Employees of the Pensacola (Fla.) Electric Company were guests of the officials of the company at a banquet on the evening of May 6 at the San Carlos hotel. The banquet was held in honor of the red team in the safety-first campaign, this team having made the best record during the last six months in accident prevention.

Wage and Labor Conditions in Steam Railroad Car Building and Repairing

The bureau of labor statistics of the United States Department of Labor recently published, as Bulletin No. 163, a report on wages and hours of labor in the building and repairing of steam railroad cars. The report is based on information obtained from the principal representative establishments in the industry. Figures are presented in this bulletin for rates of wages per hour and full-time hours of labor per week for the years 1907 to 1913 and for full-time weekly earnings for 1910 to 1913.

Full-time weekly earnings of the employees in the principal occupations in this industry in 1913 were 5.5 per cent higher than in 1912, 6 per cent higher than in 1911, and 8.9 per cent higher than in 1910. Average rates of wages per hour for 1913 were 6.3 per cent higher than in 1912, 6.4 per cent higher than in 1911, and 9.9 per cent higher than in 1910. The full-time working hours per week in 1913 were 0.7 per cent lower than in 1912, 0.4 per cent lower than in 1911, and 1.1 per cent lower than in 1910.

The data for 1913 were obtained from seventy-three representative establishments and covered more than 42,000 employees. The average full-time weekly earnings in 1913 in the principal occupations in these representative establishments were as follows: Cabinetmakers, $19.03; carpenters and car builders, wood, $17.11; car repairers, $15.15; fitters, $15.99; laborers, $10.58; machine woodworkers, $16.26; machinists, $17.81; painters, $17.77; pipe fitters, $18.56; riveters and buckers, $19.41; tinners, $19.28; truck builders, $15.31; upholsterers, $19.50.

In 1913 the full-time hours of labor per week were under fifty-four in quite a number of the establishments visited and over sixty in but very few. The predominating full-time hours per week were fifty-four, and the average about fifty-six.

Jitneys at El Paso, Tex.

El Paso was one of the first cities to be afflicted with the jitney. The first ten cars were placed in operation in November, 1914, by a concern known as The Jitney Company. Later it bought eight cars more, but did so without reckoning seriously on competition. The result is that while this concern is still in business it is operating apparently without profit. The maximum number of cars in 5-cent service at El Paso is now about 160. One of the results of the jitney competition has been a cut in auto livery service from an average of $4 to $2 an hour. The jitneys will perform the same service at the rate of $1.50 an hour.

The jitneys do not operate on any specified routes or according to any schedule. Many of them also frequently give up the 5-cent business to carry soldiers to and from local posts for 15 cents one way or 25 cents a round trip.

El Paso also has ten 5-cent auto-buses which seat fourteen passengers each. These were operated at first by the Auto-Bus Company, which has since been absorbed by the Jitney Company.

The total business of all these auto vehicles, exclusive of livery service, is estimated to be less than $4 per car per day. Quite a large number of the jitneys, as in other cities, are operated only during the peak hours on the spare time of their owners. No ordinance to regulate this business is in effect.

The *Tramway Bulletin*, published in the interest of the Denver (Col.) Tramways Company, will in the future publish items of interest concerning the Denver & Intermountain Railway and its operation.

Convention of N. E. L. A.

The Convention of the National Electric Light Association Was Held at San Francisco June 8-11. Abstracts of a Number of the Papers Are Published

The annual convention of the National Electric Light Association was held this week at San Francisco, the meetings being at the hall of the Native Sons of the Golden West. Two special trains were run from New York. The convention began with a general executive public policy session on the morning of Tuesday, June 8. At its conclusion the association held several parallel sessions, three during the afternoon of Tuesday, three on Wednesday morning, two on Wednesday afternoon, three on Thursday morning and two on Friday morning. These divisions were termed respectively, technical and hydroelectric, accounting, and commercial. There was another general session of the evening of Thursday at which the report of the public policy committee was presented by W. W. Freeman, and when there was an address on "Municipal Regulation of Public Utilities" by John H. Roemer, formerly member Wisconsin Railroad Commission and now general counsel H. M. Byllesby & Co. The final general session was held on Friday morning, at which papers were presented on topics of general interest, and officers for the ensuing year were elected.

Abstracts of some of the papers follow:

President's Address

In his annual address President Scott said, in part:

"We sometimes boast that our industry has attracted, on the whole, a very intelligent and industrious class of employees, but I wonder if the employee who is in contact with the consumers and the public could answer only a few of many questions that arise daily. Could he explain in a simple manner how and why corporations were created? Does he know what a mortgage or a bond is, and could he explain the provisions of a mortgage if there is one on his particular property? Could he explain the difference between an ordinary mercantile business and the public utility business? Does he know that, when averaged over a period of time, it is necessary to provide $5 of capital for each $1 of increased gross business, and could he explain how new capital is raised for public utility enterprises? These and many other questions that could be asked seem elementary to some of you, but I am very sure that many of us have assumed that our employees are better informed than is the case, and that it might be well to investigate the matter. It only seems to me to prove another excellent reason for employees' or company section meetings through which valuable information can be disseminated.

"The tendency of the times is making it hard for public utility companies to raise capital, and if this continues it will retard the wonderful possibilities in the growth of the electrical business and the public will suffer. For instance, if our regulating bodies will not allow a return sufficient to attract capital, fewer extensions to residential customers will be made and the extensions to the rural districts will be postponed. It is a fact that the public is more interested in the ability of public utility companies to keep pace with the growth of the communities and to render good service than in the rate for the service. I am not a pessimist, for we know the men in our industry have solved many big problems in times past and they are capable of convincing the public ultimately that capital and brains should be rewarded liberally."

Report of Committee on Prime Movers

The report of the committee on prime movers expressed the opinion that probably the most important recent developments have been in surface condensers. Data were given regarding the performance of economizers installed in the Fisk Street station of the Commonwealth Edison Company, Chicago. Attention was called to the importance of providing instruments in the boiler room to show firemen the performance of furnaces and boilers. Among other subjects treated in the report were the effect of air leakage on fuel economy, methods of improving the performance of old condensers, electrical-resistance method of determining surface-condenser leakage, ventilating and cooling of electrical equipment, the deleterious effects of sodium carbonate on boilers, methods of burning coal dust, and means for computing the commercial value of various grades of coal from the ash content. A statement was given of the fuel-oil production and probable supply in the United States and Mexico, which indicates that vast quantities of this fuel are available.

The progress of Diesel engine development in this country was outlined and brief reference was made to installations of Humphrey pumps and gas engines. A letter from Prof. R. H. Fernald, which concluded the report, contained an outline of gas-producer practice in this country and Europe. In the appendix were described several methods of measuring plant feed-water under test and under operating conditions.

Oil Fuel for Standby Plants

According to the paper entitled "Oil-Burning Standby Plants," by C. H. Delany, the Pacific Gas & Electric Company has found that oil fuel has many advantages over coal for operating standby stations, especially when such plants must be kept in readiness to carry indefinite loads without notice. Boiler efficiencies as high as 80 per cent have been obtained, for the reasons that less excess air is required for oil combustion, very little energy is required to carry away furnace gases, leakage through the boiler setting is small because of the lower draft employed, and banked fires are not required. From 1 to 4 per cent of the total steam generated is required to atomize the oil so that it can be burned efficiently. About 0.3-in. draft has been found sufficient to operate boilers at 200 per cent rating. Starting with cold water in the boilers, it has been possible to raise steam with oil-burning equipment in twenty-five minutes to thirty minutes.

At the standby station in San Francisco all of the boilers necessary for supplying city service are kept under a light load continuously so they may be forced to carry extra load whenever hydroelectric service is interrupted. At the Oakland and Sacramento plants groups of boilers are fired in rotation so that they will always be hot and ready to generate steam quickly. Tests have shown that starting with a light load, carrying a short peak load, and then returning to the original condition in three minutes, about 0.08 lb. of oil is required per rated boiler-hp. The amount of fuel required to maintain 160 lb. steam pressure when no steam is being used has been as low as 0.038 lb. per hour per rated boiler-hp, or about 1.4 per cent of the quantity required to operate the boiler at its rated value. Other

tests to determine the amount of fuel required to restore normal pressure in boilers showed unit fuel consumptions, ranging from 0.105 lb. to 0.685 lb. per boiler-hp, depending on the construction of the dampers and on the number of hours the boilers had been standing unfired or disconnected from the steam mains. During normal operation of the Oakland plant about 1.22 lb. of oil is used per day per rated boiler-hp to keep the nine boilers hot. In addition to this there is the cost of labor, making a monthly unit expense of about $3.18 per kw of equipment installed, which is in addition to the amount involved in keeping the turbines in operation.

Assuming that turbines in standby stations must be kept on the line, some economy can be effected by arranging to give the station notice when it will be required to carry a heavy load. Auxiliaries should be electrically driven, where practicable, so that there will be no excess exhaust steam when the plant is running with a light load. Although the fuel burned when a standby station is not operating is much less than when it is carrying a load, the standby losses are nevertheless considerably more important than the operating losses, since the latter continue for only about 5 per cent of the time.

Report of Committee on Electrical Apparatus

Descriptions of recently developed electrical apparatus and a switchboard manual intended to serve as a guide in selecting switchboard and instruments made up the bulk of the report of the committee on electrical apparatus. Attention was called to the gradually increasing ratings which can now be obtained in single generating and transforming units. Reference was also made to portable and automatic substations, which are operating satisfactorily at pressures as high as 100,000 volts and ratings as high as 3000 kva, and a description was given of one used on the Piedmont-Northern Railway comprising a 1500-volt generator, a 2200-volt synchronous motor and a three-phase 44,000-volt transformer, said to be the first portable railway substation with as high a voltage as 1500. The mercury arc rectifier on the 1000-hp locomotives on the New Haven Railroad is reported to be working satisfactorily and to have made more than 20,000 miles.

Committee Report on Underground Construction

The report of the committee on underground construction contained three sections—the first relating to manhole and conduit construction, the second to cable data and protection, and the third to equipment, devices, etc. Reports received from companies owning approximately 75 per cent of the underground equipment in this country show that they have 100,862,587 duct-ft. of subway intended for electric-service conductors. According to the committee report, there exists a greater difference in practice among these companies than appears to be justified. When pressures of 10,000 volts or over are used in cable systems, careful consideration should be given to causes of heating, among which are the losses in the conductor and in the dielectric material. Loss due to leakage through a dielectric appears to be greater with some resinous compounds than with some of the mineral oil compounds, and varies greatly with changes in temperature. Attention was called to the fact that the radiation from cables changes according to the season of the year. It was suggested that some scheme for ventilating conduit be devised. To prevent disastrous fires the committee has recommended the bonding of all lead cable sheaths, the use of concentric cable and the use of fireproof cable coverings in every manhole. The advantages and disadvantages of concrete shelves, split-tile ducts, asbestos rope, cement coatings with rope bond and asbestos tape saturated with silicate of soda or bound with metallic tape were discussed. There was a difference of opinion regarding the desirability of sealing ducts opening into manholes, but separating the ducts into groups by barriers of concrete or earth was recommended. For the benefit of companies desiring to have subway construction done by outside contractors specification and contract forms were included. The report was concluded with descriptions of labor-saving and accident-preventing devices.

Report of the Lamp Committee

According to the report of the lamp committee, the disturbed condition of the country has had its effect upon the lamp business, and during 1914 the aggregate sales of domestic incandescent lamps, exclusive of miniature units, totaled slightly under 100,000,000, which was the output for the preceding year, 1913. The 1913 sales represented an increase of about 11 per cent over 1912. Sales of tungsten lamps now amount to 70 per cent of the total domestic lamp sales. The tantalum lamp has disappeared from the market. The average size of the lamps sold during 1914 was 38.2 cp and 48 watts, making the average efficiency 0.8 cp per watt.

Nearly 1,000,000 gas-filled lamps were sold during 1914. Improvements in these lamps have been along the line of securing a more uniform product. The principal change in design has been to adopt a new line of bulbs in standard sizes. It is customary to insert a mica disk deflector between the stem and filament of these lamps, thereby deflecting hot gases from the glass seals and base. Usually these lamps are constructed for but one position of burning, namely, tip-down.

The improvements in vacuum lamps during the last year are noticeable principally in increased efficiency. Since last year's report this improvement has been in the neighborhood of from 7 to 10 per cent in sizes below 150 watts. The practice of introducing chemicals to delay the discoloration of the bulb has been extended to include 10-watt, 15-watt and 20-watt lamps and has permitted the operation of all vacuum lamps at higher efficiencies with improved maintained candle-power. According to the committee, inferior tungsten-filament lamps, of both the vacuum and gas-filled types, are making their appearance on the market in increasing numbers.

Report of Committee on Public Policy

The report of the committee on public policy was signed by the committee consisting of W. W. Freeman, E. W. Burdett, H. L. Doherty, C. L. Edgar, Gen. George H. Harries, Samuel Insull, John W. Lieb, J. B. McCall, T. E. Murray, H. H. Scott, Samuel Scovil, Charles A. Stone, H. A. Wagner and Arthur Williams.

It expresses gratification that the conclusions and recommendations made by the committee in past reports have been accepted so generally by member companies and that further experience continues to confirm the soundness of the association policies. It says that the past year has been one of anxious uncertainty in most business quarters. Beginning with contraction in business activities due to political and legislative changes, and followed by the outbreak and active continuance of the European war, the entire commercial fabric has been subjected to severe strain. It is evident, however, that for several months conditions have been improving surely, if slowly, and the industry has demonstrated again the stability and reliability of its investments and earnings under adverse business conditions.

The report then quotes recent figures of earnings for steam railroads and public utilities to show that the

utility companies, and especially electric light companies, are affected in much less degree by varying financial and industrial disturbances than most other business enterprises, and says that as this fact becomes recognized more fully by the investing public, the securities representing electrical properties should become established still more thoroughly in their confidence and esteem. Member companies will do well to broaden the market for their securities by keeping their local investors informed as to the relative merits of electric lighting and other securities, and by a policy of frank publicity as to their earnings and financial condition. It would also be well, the committee adds, to give special attention to legislation restricting or affecting the investment of savings and trust funds, so that electric lighting bonds may receive due recognition as conservative and safe investments.

The committee then points out that thirty-two states and the District of Columbia now have commissions regulating electric light utilities but notes with regret a tendency recently in several states to give commissions a political complexion. If partisan politics seem to demand an occasional change in personnel to correspond to changed party control, such substitutions, the committee says, should be made with great care and always with due regard to the responsibilities and requirements of the office.

The question of what is a reasonable rate of return has been passed upon in specific cases by the commissions of at least fifteen states and, in cases of electric properties, 8 per cent is the figure which has been adopted generally; 7 per cent has been fixed in two cases and as high as 10 per cent in as many others. It has been recognized generally by the commissions that the prime necessity, from the public standpoint, is to insure adequate and reliable service, and that the measure of return to be allowed an electric company should be at least the measure of wages which must be offered to capital to secure its ready employment in the business.

As to the necessity or advisability of a definite appraisal of existing property for the determination of rates, a marked difference is indicated by the action of the various commissions and the laws of the several states. In some states the laws require an appraisal in advance of the fixing of rates by the commission. In Ohio and Oklahoma orders have been issued by the commissions calling for appraisals of the properties of all utilities, irrespective entirely of pendency of rate cases. Such sweeping orders, in the opinion of the committee, involve large expenditures of money and labor on the part of the companies, without corresponding advantages to the public. Furthermore, if such appraisals are to be of admitted value to the public, they must be verified by the commissions, thereby involving further large expenditures of money and labor on their part. In view of the sweeping appraisal order of the Ohio commission, the committee notes that in the first electric rate case—and thus far the only one determined by that commission (that of the company in Bucyrus)—the commission reported, after the completion of a detailed appraisal, that it would be necessary to increase rates in order to yield a return of even 6 per cent per annum on the appraised value; and because of that fact, and since the company did not wish to increase rates, the commission proceeded to fix a new and lower schedule which represented its judgment as to the rates at which consumers were reasonably entitled to obtain electric service, and which, in the judgment of the commission, would serve promptly to effect such growth of business as would yield a reasonable and satisfactory return. This somewhat novel case was concluded by the acceptance by the company of the schedule imposed by the commission. In the New York Edison Company case, in which reduced rates became effective on May 1, 1915, opinions were filed by each of the five commissioners, and all agreed that in order to avoid further delay rates should be fixed without definite valuation. The committee agrees with the Massachusetts Commission in the Northampton gas case, that the matter is not one of "mathematical demonstration" but must involve the exercise of "sound judgment." But where appraisals are undertaken (and they may be of distinct advantage in proving the intrinsic value of capital securities), the committee says that it is important that companies be careful to include all of the elements of value, both physical and intangible, which go to make up a proper and complete appraisal.

Reference is made by the committee to the decision rendered on Dec. 9, 1914, by the New Jersey Court of Errors and Appeals, and reported in this paper, in the matter of franchise value as affecting rates of the Public Service Gas Company in the Passaic division. It also says that many prominent students of public affairs, after investigation, have announced themselves clearly as in favor of regulated monopolies in preference to competition, and, as conspicuous cases, the committee quotes from addresses of President Wilson, ex-President Roosevelt and Senator Underwood of Alabama.

The issue of municipal ownership, the committee says, is probably where it was a year ago. The committee continues to believe that municipal ownership and operation of lighting utilities is against the public interest excepting where, on account of local conditions, private capital is not readily available for such service. As an economic proposition, municipal ownership has not "made good."

The committee refers to the decision of the United States Supreme Court in the case of the Norfolk & Western Railway Company, decided on March 8, 1915, as of special interest to companies doing a combination business, such as electricity and gas, or electricity and street railway, and it may possibly apply to different divisions of the business of an exclusive electric company. In this case it was contended that earnings from the freight business should be considered as offsetting the reduction involved in limiting the passenger fare to 2 cents per mile. It was held that the rate was confiscatory because when applied to the passenger business alone, separately considered, it was found to yield but a narrow margin above the cost of such traffic.

In referring to the subject of public relations the committee says that for years it has been preaching the gospel of first-class service, reasonable rates and liberal treatment of the public as essential to the permanent prosperity of any utility company. It believes that the time has come to stop talking about the shortcomings of years long past as excusing a disinclination to give credit where credit is now due, and it asks whether the time has not now arrived when it is fitting to say something about the obligations of the public to recognize and reward services faithfully and efficiently performed. The companies are, in a very real sense, public servants; their prime obligation is to serve the public, but their measure of reward ought to be reasonably proportionate to the value of the service rendered.

The report continues that there is danger through too drastic restriction that the desirable incentive to unusual efficiency will be destroyed, and that the public will be the greatest sufferer thereby. There is real need to-day of an intelligent conception of the respective duties of public master to public servant as well as of public servant to public master. A servant who is ill fed and underpaid cannot render good service, whether such servant be an individual or a public service cor-

poration. What is needed most is an appreciation of the actual facts, with a knowledge of which the public is inclined to be fair.

In conclusion, the report says it is undeniable that a strong and efficient public utility in any community is a distinct asset to the entire community. It is invariably one of the largest taxpayers, and through its service promotes industrial development and general business activity. In view of these facts, it is entitled to the good will of at least the intelligent members of the community, and the withholding of such good will is of direct disadvantage to all business interests. From selfish motives, if not otherwise, the business people in every community should exert every reasonable effort to promote a sympathetic understanding of the difficulties and problems confronting utility companies, in order to secure the measure of public co-operation to which they are entitled by reason of a service honestly and efficiently supplied, and in which the general public, whether they appreciate it or not, are essential partners. The committee suggests that member companies should insist upon the recognition of their just claims for public support, believing that an aggressive policy with this object in view will attract attention and win respect.

Overhead Line Construction

This committee had no meetings during the year but the chairman's report outlines the general situation. It called attention to the general acceptance given to its previous reports as well as to the necessity of making changes in standard practice as construction methods develop. The committee considers the most important work of the year from an overhead construction standpoint is that of the national joint committee on overhead and underground line construction, on which the N. E. L. A. is represented by three members. The work of this committee has been divided among four sub-committees: structural, installation, conductors and clearance, and these sub-committees are investigating the subjects assigned to them in a thorough manner. The report continues that United States Bureau of Standards issued in April a preliminary set of "Safety Rules and Regulations," and the importance of this work has been recognized by the N. E. L. A. in the appointment of a public policy sub-committee for conference with the Bureau of Standards. While modifications have been made in the first draft of the proposed safety rules, the committee believes that these rules "as now presented, both in their general methods and in their specific provisions, still contain many features which are objectionable for general adoption, and the member companies should avail themselves fully of the opportunity offered by the Bureau of Standards for general thorough criticism of the preliminary rules." The committee also calls attention to a proposed set of regulations for high-voltage lines in cities being drafted by the International Association of Municipal Electricians, to an order on overhead standards recently issued by the Idaho Public Utilities Commission and to the preparation by a joint committee in Pennsylvania of overhead line specifications which may serve as a basis for an official order by the commission in that state. The report concludes by mentioning the adoption by the California Railroad Commission of rules tending to minimize inductive interference, drafted by a joint committee representing the various interests involved.

Electrification of Main Line Railroad

This report, presented by a committee of which B. F. Wood is chairman, called attention to the advantages of the supply of power to main line railroads from a central system serving an extensive territory with diversified power requirements. In a specific case that has been called to the attention of the committee, the power system of an electrified steam road, including station, substations and transmission lines, represented approximately one-half of the new capital requirements above the amount chargeable to renewals and replacement, or about one-third of the total cost, and the road could have afforded to have purchased energy from a central station and still obtain a net return nearly 50 per cent greater than by developing its own power supply. The committee gives other arguments for the purchase of electric power instead of its generation by railroads, and says that if the railroads provide their own generating and distributing facilities, they will find it difficult later to convert these facilities to the use of central station energy if such a plan should be desirable.

Municipal Regulation of Public Utilities

At the public policy meeting on Thursday evening a paper by John H. Roemer, general counsel H. M. Byllesby & Company, Chicago, and formerly chairman Railroad Commission of Wisconsin, was presented. The author showed that through natural causes the advantages of state regulation as opposed to municipal regulation or ownership of public utilities were becoming increasingly apparent. In the early days public utilities largely confined their operations to the various municipalities in which they happened to be located, but now these operations are becoming less and less nearly co-extensive with the boundaries of any one municipality. This applies to electric railways, telephones, electric light and power, and even water and gas systems.

This condition seems certain to continue as the economic development of electric public service companies' systems has been found to require larger and larger units of production. An example of the benefits resulting to the public from the combination of small public utilities is the Central Illinois Utilities Company, which serves twenty-three or more communities in Illinois from a single station. Formerly these communities were served by nine small separate generating plants.

When one appreciates how increasingly inter-related and inter-dependent public service companies are becoming, both as to their physical operation and their corporate control and ownership, it is easy to see that municipal ownership would not be in the direction of the most economic development of public utilities. The author quoted here some abstracts from the decision in South Pasadena v. Terminal Railway Company (1895, 109 California, 315) in which the court described the difficulties which would arise in case extra-territorial municipal power should be permitted. He also quoted City of Texarkana v. Southwestern Telegraph & Telephone Company (48 Texas Civil Appeals, 16) to show the interest of the state at large, even in municipal ordinances relating to utilities. Again, it is to the interest of the state as a whole that there should not be over-development in one locality and under-development in another. With municipal ownership it is almost impossible to conceive of sufficient continuity of policy and breadth of view to cope successfully with the problems presented.

The speaker then criticised the theory that municipal ownership is an adequate substitute for state regulation and pointed out that municipal plants as a rule furnished poorer service than privately owned or operated utilities; they are less responsive to new discoveries and improved methods; they practise flagrant discrimination in rates and are backward in their methods of bookkeeping. In conclusion the speaker stated that there should be certain standards of service uniform throughout the state, but subject to modification, of course, when a local situation of an unusual nature demands it.

Electrification of the Jamestown, Westfield & Northwestern Railroad

This Line, Which was Originally Built to Handle a Freight Transfer Business Among Several Trunk Roads, Has Been Transformed into a High-Speed Interurban Railway to Develop a Passenger Traffic Among the Many Summer Resorts Along the Line

The Jamestown, Westfield & Northwestern Railroad is an interesting case of the transformation of an old steam road, originally built as a connecting link for freight interchange among several trunk lines, into a high-speed interurban electric railway.

Formerly called the Jamestown, Chautauqua & Lake Erie Railroad, this railway connected the Lake Shore & Michigan Southern and Nickel Plate Railroads at Westfield with the Pennsylvania Railroad at Mayville and with the Erie at Jamestown. Because of changes in traffic conditions the property was no longer a paying proposition while dependent for its revenue upon freight haulage only. To secure the additional income from passenger and freight traffic between Jamestown and Westfield and intermediate towns, as well as to obtain the advantages of electric operation, the road has recently been electrified.

Beginning at Westfield, which is near the Lake Erie shore, the road ascends a very steep grade to the top of the bluff bordering the lake. On a clear day it is possible to obtain a splendid view of the lake from the car windows. The road then drops down slowly, through Mayville into a valley, passing through the picturesque villages and summer resorts on the north side of Chautauqua Lake. The passenger traffic will come largely from the many summer resorts along the route and consequently will be far heavier in summer than during the winter months.

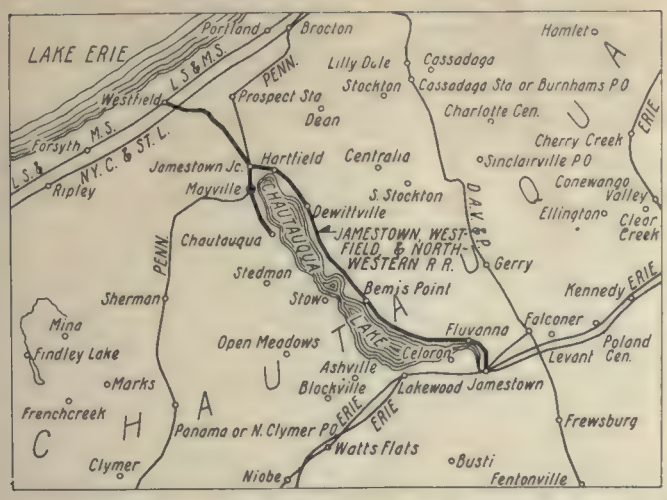
The freight traffic which this railroad expects to handle will consist not only of interchange freight among the trunk lines which it intersects but also ice from the icehouses bordering Lake Chautauqua, coal to manufacturing plants in its territory and, most important of all, freight and farm produce for the farmers all along the line. To handle this traffic, the Jamestown, Westfield & Northwestern Railroad proposes to haul mixed freight trains of from four to eight cars. The old steam locomotives are still used for this service.

Energy Distribution

Power to operate the road is purchased, at a cost of 1½ cents per kilowatt-hour, from the Jamestown Street Railway, which is also controlled by A. M. Broadhead, president of the Jamestown, Westfield & Northwestern Railroad. The Jamestown Street Railway has a large power plant at Jamestown, and its subsidiary, the Chautauqua Traction Company, maintains substations at Stow and at Mayfield. By tying in the feeders and trolleys at Jamestown, Stow and Mayville, it has been possible to obtain fairly good power distribution for the interurban road without necessitating the use of additional generating apparatus.

By reference to the map, it will be seen that the town of Stow, where one of the substations is located, is on the opposite side of the lake from the tracks of the Jamestown, Westfield & Northwestern Railroad. Lake Chautauqua is very narrow at this point, and the energy is transmitted across by two ungrounded lead-covered

JAMESTOWN ELECTRIFICATION—MOTOR CAR ON JAMESTOWN, WESTFIELD & NORTHWESTERN RAILROAD, QUARTER VIEW



JAMESTOWN ELECTRIFICATION—MAP SHOWING ROUTE OF THE JAMESTOWN, WESTFIELD & NORTHWESTERN RAILROAD

submerged 500,000 circ. mil. cables. Double-throw switches are installed at each end, so that if the positive cable should become grounded it will be possible to change over and use the negative cable as the positive conductor until the other cable can be repaired.

A permanent substation will shortly be built at Westfield in order to take care of the heavy pulls which occur on this part of the road in going from Westfield to Mayville. At present a portable substation is located at this point. This portable substation was provided only after a close study of the operating conditions, and it has already proved its usefulness in caring economically for the wide fluctuations in traffic which arise particularly during the summer season. One of the illustrations shows this substation in service at Bemis Point, where it was first used to handle an unusually heavy load due to a convention.

The equipment of the portable substation, which is of Westinghouse Electric manufacture, consists essentially of a three-phase, 550-kva, 16,500-volt transformer of the outdoor type, and a 500-kw, 600-volt rotary converter. The rotary, switchboard, meter, transformers, etc., are housed in a cab which is also equipped with a desk, telephone, etc., for the use of the operator.

The high-tension circuit is controlled by a three-pole Burke horn-gap switch with choke coil, lightning arrester and fuse. All of the high-voltage switching apparatus is mounted on the roof of the cab, although the switches are operated from the switchboard by means of a standard remote control handle.

JAMESTOWN ELECTRIFICATION—VIEW OF 45-TON FREIGHT LOCOMOTIVE

The cab is 18 ft. long, and the car has an overall length of 28 ft. The general construction of trucks, draft gear, etc., is in accordance with M.C.B. standards.

ROLLING STOCK

The passenger cars, one of which is illustrated, are of the usual interurban type, seating sixty passengers. One-third of the car is partitioned to form a smoking compartment. The cars are of all-steel construction and are insulated throughout with compressed cork to keep out heat and cold. They were built by the Cincinnati Car Company. The principal dimensions follow:

Length over all	53 ft. 6 in.
Length over dash	52 ft. 2 in.
Height (rail to top of roof)	12 ft. 10½ in.
Extreme width	8 ft. 9¼ in.
Door openings (clear)	30 in.
Rail to first step	14¾ in.
Width of seats	38½ in.
Width of aisle	23¾ in.
Bulkhead door opening (clear)	36 in.
Partition door opening (clear)	22 in.

JAMESTOWN ELECTRIFICATION—500-KW, 25-CYCLE, 600-VOLT ROTARY-CONVERTER PORTABLE SUBSTATION

The electrical equipment of each car consists of four Westinghouse No. 306-A-2 railway motors rated at 52 kw (70 hp) at 600 volts, and the HL unit switch control system. The split frame is of cast steel, divided along the horizontal center line with hinges on the opposite side from the axle.

A Baldwin-Westinghouse freight locomotive will be put in active service within a few weeks. It is a 45-ton machine, of the double-truck type. It will handle standard railway rolling stock, and is intended to traverse curves of 170-ft. radius with a trailing load, and of 40-ft. radius without load. It is arranged for double-end operation, and has a central cab, with sloping hoods at each end, as shown in the illustration.

The electrical equipment consists of four Westinghouse No. 562-A-6 motors, each rated at 100 hp at 600 volts with HL electropneumatic control. An interesting feature of the design of the motors is that they are fitted both for self-ventilation and forced cooling. A motor-driven blower is furnished to provide a blast of air irrespective of the speed of the motors. However, should the blower be put out of commission, fans on each armature provide sufficient ventilation to allow the locomotive to operate at three-quarters of its rated capacity. The principal dimensions are as follows:

Wheelbase, rigid	6 ft. 6 in.
Distance between truck centers	16 ft. 0 in.
Diameter of wheels	36 in.
Size of journals	5 in. x 9 in.
Width	10 ft.
Height to top cab	12 ft.
Length between coupler knuckles	34 ft. 9½ in.
Weight	90000 lb.

Meeting of C. E. R. A. A.

Three of the Papers at the Annual Meeting at Indianapolis This Week Discussed Respectively "Analysis of the Balance Sheet," "Electric Light and Power Accounting by Combined Railway and Light Property," and "Small Electric Line Handling Carload Freight"

The twenty-seventh meeting of the Central Electric Railway Accountants' Association was held at the Severin Hotel, Indianapolis, Ind., on Friday and Saturday of this week. Abstracts of three papers presented at that meeting follow. A report of the proceedings and abstracts of the other papers presented at the meeting will appear in a later issue.

ANALYZING THE BALANCE SHEET

BY L. T. HIXSON, AUDITOR TERRE HAUTE, INDIANAPOLIS & EASTERN TRACTION COMPANY, INDIANAPOLIS, IND.

After a balance sheet has been prepared in accordance with the best accounting practice, there remains much to be done before all the available information is put into condition to be quickly grasped. In order better to illustrate the analysis of a balance sheet, the following usual form statement is taken as the basis:

Assets	
Fixed property	$26,000,000
Current assets	700,000
Accrued and prepaid accounts	45,000
Deferred or pending accounts	7,000
Reserve funds	20,000
	$26,772,000

Liabilities and Capital	
Bonds	$7,500,000
Capital stock	17,000,000
Current liabilities	600,000
Accrued liabilities	400,000
Reserves	272,000
Surplus	1,000,000
	$26,772,000

This balance sheet, when analyzed, will show:

Invested assets:	
Fixed property	$26,000,000
Less capital stock and bonds in hands of public	24,500,000
Excess invested assets over stock and bonds	$ 1,500,000
Appropriated assets:	
Reserve funds	$ 20,000
Book reserves	272,000
Balance reserves for which no specific assets have been set aside	$ 252,000
Balance invested assets, after providing for reserves	$ 1,248,000
Current assets	$ 700,000
Current liabilities	600,000
Excess current assets	$ 100,000
Balance	$ 1,348,000
Accrued and prepaid accounts—assets	$ 45,000
Accrued liabilities	400,000
Excess accrued liabilities	$ 355,000
Balance	$ 993,000
Deferred or pending accounts—assets	7,000
Balance, unappropriated assets in excess of stock and bonds (surplus)	$ 1,000,000

This shows the amount of permanent or fixed investment in excess of the capital stock and bonds in the hands of the public; also the amount of book reserves which are invested in the general company property, such amount being the excess of book reserves over assets specifically set aside for reserve funds. These book reserves may represent amounts set aside for injuries and damages, bonds purchased and canceled, and so forth. They may also represent bonds purchased and not canceled but held by the sinking fund trustee. In this paper such bonds are not shown as a part of the contra account (sinking fund), inasmuch as they have been deducted from the total bonds and only bonds "in hands of public" shown.

The statement also shows the excess of current assets over current liabilities, and excess of accrued liabilities over accrued and prepaid accounts—assets. The balance, or excess of unappropriated assets over stock and bonds, represents the surplus earnings and will be in agreement with the analysis of the income statement, together with direct charges and credits to surplus.

There may be some question as to the advisability of showing the excess reserves over assets specifically set aside, as invested in fixed property of the company. There would seem to be no ground for this objection so far as the reserve represents bonds purchased; but if it represents injuries and damages, or some contingent liability, for which it might be necessary to pay out a considerable sum, it would perhaps be best to set up an additional amount to provide for contingent liability reserves in excess of the amount specifically appropriated, so that the statement would show clearly the comparison between unappropriated current assets and current liabilities. When treated in this manner, assuming that such contingent liability reserve amounts to $200,000, the statement would read, in part:

Excess invested assets over stock and bonds		$1,500,000
Appropriated assets—		
Reserve funds	$ 20,000	
Current assets set aside for contingent liability reserve in excess of specific appropriations	200,000	
	$ 220,000	
Book reserves	272,000	
Balance reserves invested in fixed property		$ 52,000
Balance invested assets after providing for reserves		$1,448,000
Current assets	$ 700,000	
Less amount set aside for contingent liability reserve as above	200,000	
	$ 500,000	
Current liabilities	600,000	
Excess current liabilities		$ 100,000
Balance		$1,348,000

There would be no change in the remainder of the statement.

If this plan is followed, there would be no need to set aside any certain group of assets to offset the book reserves, for the reason that the analysis would always show clearly just what amount of assets was available after making provision for the reserves. This would meet the objection of those who contend that it is poor policy to take a sum out of the business and place it on deposit at interest, when the needs of the business may then require the borrowing of a similar amount at the same or perhaps a higher rate. Moreover, for those who take the view that there should be a fund to represent all book reserves, the analysis will show just how the company would stand if such amounts were set aside.

The foregoing should show clearly how the surplus has been invested. Yet, for the benefit of those who are asked the following question: "The books show that the surplus is $1,000,000, but the cash balance is $200,000—what has become of the money?" a statement of surplus on a basis of cash or its equivalent may be of some benefit.

Surplus per books	$1,000,000
Add—	
Accrued liabilities which have been deducted in the income statement, but cash not paid out	400,000
Excess accruals for reserves over cash set aside	252,000
	$1,652,000
Deduct—	
Accrued revenue which was taken into the income statement, but cash not received	$ 30,000
Prepaid accounts which have not been included in the income statement as items of expense on account of applying to a later period	15,000
	$ 45,000
Surplus, on cash basis	$1,607,000
Cash from loans, etc	600,000
Total to be accounted for	$2,207,000
Invested in—	
Fixed property	$1,500,000
Deferred and pending accounts	7,000
Accounts receivable	200,000
Stores	300,000
	$2,007,000
Cash balance	$ 200,000

This latter statement will not ordinarily be required except by the active head of the concern with relation to the disposition of the surplus for that period.

ELECTRIC LIGHT AND POWER ACCOUNTING

BY OREN A. SMALL, AUDITOR BENTON HARBOR-ST. JOE RAILWAY & LIGHT COMPANY, BENTON HARBOR, MICH.

The uniform classification issued by the Michigan Railway Commission, taking effect Jan. 1, 1915, provided in the case of combined railway and lighting properties for making a showing of investment in light and power department, as nearly as it was possible to ascertain, prior to Jan. 1, 1915, in a lump sum, and accounts were required to be set up subsequent to that date in accordance with the text of the uniform classification.

Our company does not carry any accounts for stocks, bonds or mortgages for the light and power department, these accounts covering the property as a whole. Power station apparatus is also covered by whole-property accounts. We purchase power coming to us at our sub-station at 26,000 volts at the transformers and 2300 volts on the bus-bar. These transformers are the property of the supplying electric company, so that our investment in the power station for the light and power department consists mainly of switchboard apparatus.

The following accounts have been set up and are being kept in accordance with the commission uniform classification of accounts:

INVESTMENT ACCOUNTS

Underground conduits and subways
Poles and fixtures
(These accounts are sub-divided, to show investment in each community served.)

Distribution System

Land
Overhead conductors and devices
Service wires
Underground conductors
(These four accounts are sub-divided in the same manner as the underground conduit and subways, and the pole and fixture accounts.)
Meters
Transformers
Arc lamps
Municipal street lighting system
(This account includes all items pertaining to street lighting arc lines, except the cost of lamps.)
Office furniture and fixtures
Shop equipment
Storeroom equipment
Stable and garage equipment
Miscellaneous equipment:
(a) Laboratory equipment
(b) Tools and implements

INCOME ACCOUNTS

Commercial lighting
Commercial power
Municipal street lighting, arc
Municipal street lighting, incandescent
Municipal building lighting
Municipal power
Miscellaneous electric revenue
Non-operating revenue
(All income accounts are sub-divided to show revenue from each community served. The sub-division of these accounts requires, at the present time, the keeping of thirty-two accounts.)

POWER

(On account of purchased power, only one account is carried under this head, this being charged with the cost of power utilized in the light and power department, as ascertained by meter measurement.)

OPERATING EXPENSES

Distribution—Operation

Wages:
(a) Superintendence
(b) Wages
Supplies and miscellaneous expenses:
(a) Maps and records
(b) Office expense
(c) Miscellaneous expense
Distribution lines:
(a) Labor and expense subways
(b) Labor and expense overhead conductor.
(c) Labor and expense underground conductor
Meters:
(a) Salaries and expense
(b) Testing
(c) Miscellaneous expense
Setting and removing meters and transformers

Distribution—Maintenance

Underground conduit
Overhead lines
(a) Repairs—conductors
(b) Repairs—pole lines
Underground conductors
Service wires
Transformers
Meters

Utilization—Operation

Renewal incandescent lamps
Inspection customers' premises
Customers' installation
Municipal street arc lamps
Municipal street incandescent lamps
(a) Installation
(b) Renewals

Utilization—Maintenance

Municipal street arc lamps
Municipal street incandescent lamps

COMMERCIAL EXPENSE

Officers' salaries and expense
Salaries and expense meter readers
Salary and expense collection bureau
Office supplies and expenses
Discount light and power
Discount electrical supplies

NEW BUSINESS

Officers' salaries and expense
Miscellaneous supplies and expense
Solicitation:
(a) Salaries—canvassers
(b) Expense—canvassers
Advertising
Promotion wiring
Promotion signs and devices

GENERAL EXPENSE

Garage expense
(Any portion of expense in this account which is properly assignable to investment accounts, is so apportioned.)
Printing and stationery
General office expense
Injuries and damages:
(a) Medical expense
(b) Injuries to employees
(c) Injuries to others
Depreciation
(Under this heading is accrued each month an amount equal to one-twelfth of 6 per cent of the record value of investments, this value being taken at the close of the fiscal year preceding.)
Uncollectible bills
Miscellaneous non-operating expense
Store and stable expense

While these accounts are not all which the uniform classification calls for, they are all that might affect a company of our magnitude. The question of operation and maintenance expense is as finely drawn in the light and power classification as in the Interstate Commerce Commission classification for electric railways.

Entries are made direct from meter readers' books into the customers' ledger, proper extension being made at the same time. These extensions are transferred to the customers' invoice blanks, previously prepared on an addressograph, and the latter are mailed in window envelopes. Fifteen days are allowed in which the customer may secure a discount for prompt payment, the proper credits be posted into the ledger from the collection sheets, and the ledger balanced with the cash book and the controlling account in the general ledger.

All expense and income accounts are closed through the profit and loss account. The amount of accrued depreciation is deducted from the balance of profit and loss, and the net profit and loss is carried to the profit and loss account for the railway, this last account reflecting the profit and loss of the property operated as a whole. From this interest on funded debt and other fixed charges are deducted in the manner pro-

vided by the Interstate Commerce Commission classification. In compiling the annual report for the commission the item of profit from light and power department is carried to the income account under auxiliary operations.

CAR-LOAD FREIGHT ON SMALL LINES

BY JAMES S. CLARK, AUDITOR MARION & BLUFFTON TRACTION COMPANY, BLUFFTON, IND.

The Marion & Bluffton Traction Company, which operates 32 miles of electric railway, has associated with it under the same operating organization the Bluffton, Geneva & Celina Traction Company, which runs from Bluffton to Geneva, a distance of 18 miles, through a very rich agricultural region. This short line penetrates a territory which had been without any transportation facilities of any kind. The Clover Leaf Railroad saw its opportunity to develop some traffic for its line and encouraged the development of the car-load business by arranging for a connection between the steam and the electric line at Bluffton. Later the car-load business extended to the Marion line also. Two elevators and a milk condensory which were erected along the electric line depend upon it to handle their business to the steam roads. The elevators draw from a radius of 5 to 8 miles and, in the course of a year, deliver and receive from the steam roads from 500 to 600 cars of coal, hay, grain, lumber, tile, etc.

In 1913 arrangements were made for a steam line connection with the Cincinnati, Bluffton & Chicago Railroad. Through this we were solicited to interchange with the Lake Erie & Western Railroad, thus giving an interchange of freight and equipment with all three of the steam roads operating into Bluffton.

In reality the company serves as a feeder to the steam roads. There is no through billing with them except on stone, however, and that is only a switching rate on the steam line. On cars of coal, hay, grain, etc., we handle on a local tariff rate, between point of origin and steam road junction. We find these rates more profitable than if we were to pro-rate with the steam roads. Of late, however, we have had some complaint and believe that in the near future we will be handling this class of freight on through billing. This tariff is constructed as a commodity tariff and names rates in cents per hundred pounds. Any commodity not named in this tariff takes the regular classification rate.

Our own equipment consists of two freight motor cars. The Marion & Bluffton Traction Company owns one freight motor car equipped with four 60-hp Westinghouse 93A railway motors and the Bluffton, Geneva & Celina Traction Company has one freight motor car equipped with four 60-hp GE 87 motors. Both cars have automatic and straight air equipment and M. C. B. couplers for handling standard steam cars. We use one car to handle the L. C. L. shipments for both roads and the other car to handle the car-load shipments. When we need more cars we always get them from the steam lines, paying at the regular per diem charge of $0.45 per day while on our line. We watch this item very closely and try to hold it down to a minimum. Another item that we watch is demurrage. If we were not governed by our strict demurrage rules, we would need another 5 per cent increase in our freight rates to pay our per diem bills. Up to this year we have always collected demurrage on the straight demurrage plan, but now we are using the average plan with stone shippers. We believe this plan is very satisfactory to the large shippers.

The Erie Stone Company, one of the largest manufacturers of crushed stone, has a large quarry at Bluffton and for the last five years we have been able to secure all of this kind of freight that we could handle. This stone business as a rule starts May 1 and lasts until Oct. 1. The plant is located along the steam roads and the stone is delivered on our tracks on a switching charge of 10 cents per ton. We haul this stone in trains of three to seven cars, depending upon grade conditions. We can handle a train of four cars with a capacity of 300 tons on any grade on our line and a train of nine or ten cars with a capacity of 750 tons on level track. Last year in four months, we handled 816 cars that averaged 50 tons of stone to the car. We use both gondolas and hoppers. As our sidings are large enough to accommodate eight or ten cars, some of the shippers have their own unloaders, whereby they are able to handle the stone very rapidly.

As most of the stone is handled on sidings at non-agency points, in order to keep our records complete on the car service, our freight conductor is supplied with blanks with which he takes a receipt for every car he sets on a siding, showing the car initial and number and also the time and place. This is signed by an authorized agent of the consignee. The conductor also gets a receipt from the same agent for all cars released. These slips serve as a receipt for the freight and as a basis for computing demurrage.

We have no track scales on our line but we have no trouble in securing the correct weights. All the stone is weighed at the plant. The elevators located along our line have their own scales, and the Snider Preserve Company has two weighing stations where the tomatoes which we handle in carload lots are weighed. Those few cars on which we are unable to secure the correct weights before leaving our lines are weighed by the steam lines, who are able to give the correct weights within a week.

The additional accounting connected with the handling of carload shipments is comparatively small, as the billing of all cars is handled by the agents. They make all collections of freight and demurrage except that on stone, this collection being handled in the accounting department on account of most of the stone being delivered to sidings at non-agency points. The daily interchange of equipment is taken care of by our dispatcher because he is most familiar with the cars handled. Reclaim statements are issued each month on all cars handled on switching tariffs, such as the coal that we switch from the steam lines to the city water works and light plant. The privilege of making this reclaim of five days takes care of the per diem on these cars. The city paid for the siding and receives a credit of $1 on every car received at the plant until it is reimbursed. This switching charge is 15 cents per ton, with a minimum of 40,000 lb.

We believe that this freight business is much more profitable than L. C. L. shipments, as in the handling of 1700 cars during 1914 we did not have a claim. Moreover, every car-lot shipment that can be secured by the traffic department is a development of business that would not otherwise be handled, and the only additional expense for the handling is the cost of power and car-service charges. There will, of course, be some additional expense for track maintenance but this is not found excessive.

The following for 1914 is a fair example of the various commodities handled in one year:

Stone	816 cars	Oats	22 cars
Coal	240 cars	Pipe	21 cars
Hay	226 cars	Horses	20 cars
Corn	121 cars	Bolts	19 cars
Tomatoes	51 cars	Brick	18 cars
Tomato crates	46 cars	Tile	15 cars
Miscellaneous	42 cars	Lumber	11 cars
Wheat	27 cars	Milk	6 cars

Master Mechanics' Association

At the Forty-eighth Annual Convention at Atlantic City, June 9-11, Reports Were Presented on Electric-Locomotive Maintenance, Headlights and Other Subjects of Interest to Electric Railways. An Account of the Exhibits Is Published

The forty-eighth annual convention of the American Railway Master Mechanics' Association was held at Atlantic City, June 9-11. A number of the committee reports were of direct interest to the electric railway industry and these are published in abstract below. At this convention the association took up for the first time the subject of electric operation through its newly appointed committee on maintenance and operation of electrical equipment, the members being: C. H. Quereau, New York Central Railroad, chairman; G. C. Bishop, Long Island Railroad; G. W. Wildin, New York, New Haven & Hartford Railroad; J. H. Davis, Baltimore & Ohio Railroad, and R. D. Hawkins, Great Northern Railway.

MAINTENANCE OF ELECTRICAL EQUIPMENT

In its first report this committee has confined itself to a broad outline of the additional tools and the new organization involved by a change from steam to electricity as a motive power. The committee also has pointed out for the first time the need for establishing standards for operating records, the use of the unit "miles per detention" being considered preferable to the more common "miles per minute detention" as a basis for judging the reliability of operation of electrical equipment.

In part, the report states that up to Jan. 15, 1915, electrification had been introduced on fourteen steam railroads, to the extent of 591.3 route miles, including 1761.65 miles of track, and that for nearly ten years electricity has proved its ability to handle successfully a heavy and exacting traffic. The experience gained has demonstrated the fact that the only question to be settled regarding further electrification is that of first cost.

With regard to the new problems placed before those who may be called on to maintain electric equipment, the committee considers that experience with steam equipment is the best possible training for the new responsibilities. Indeed, few additional facilities are required for maintaining electrical equipment in a steam railroad shop. This is borne out by the following statement from the superintendent of motive power of an important eastern railroad which has considered electrified mileage: "The only additional machine required by the electric car work was a journal-truing lathe to repair both inside and outside bearings on the motor-truck axles without having to dismount the wheels. We also built a few wooden-frame, light, gantry hoists for use in applying the motors to the motor trucks. These hoists were made to span the erecting shop tracks on which the work was done and were required because the shop had no overhead crane facilities. The armature work on the cars is done on wooden horses and in a standard engine lathe. A testing transformer was also provided, together with a certain miscellaneous equipment of lifting hooks, checks and clamps, which do not deserve listing separately."

In connection with the experience with electrification, the following list shows the additional tools which were found necessary for handling the electric equipment at a certain shop which was originally equipped only for the maintenance of steam equipment: A 190-ton portable hydraulic press used in removing crank pins from discs and discs from motor shafts; hook for lifting front end of electric locomotives; lifting beam for motors; lifting beam for removing and replacing cabs; special chuck for boring jack-shaft and motor bearings; tension device for re-banding armatures on a driving wheel lathe; a 3-kw insulation-testing transformer; cradle for holding armatures after removing them from the locomotives.

Referring to the above list, the local master mechanic said: "This covers about all the special tools which we have found necessary to take care of the electrical work. The manner in which the electric equipment is handled is exactly the same as that in which we handle any other equipment."

The committee considers that a feature worthy of note in connection with the maintenance of steam and electrical equipment will be found in the comparatively small machine tools and light cranes installed in electric locomotive repair shops. The reason for this is the relative lightness of the individual parts of the electric locomotives. Another feature is that, on the average, the age of the employees in an electric equipment shop is less than in a steam equipment shop. A maintenance organization should have one or two electrical experts, mechanics rather than engineers. However, experience has shown that at least 90 per cent of the work to be done and of the problems to be solved are mechanical. There is this characteristic difference between steam and electric equipment: With steam locomotives it takes about five minutes to locate a defect and from a day to a week to make repairs; with electric equipment it takes an hour or two to locate the cause of the trouble and from five minutes to a day to repair the defect.

At the time of introduction of electric operation on any railroad, the usual plan is to qualify the regular steam locomotive engineers and firemen for service on the electric locomotives. A few days' instruction by a qualified traveling engineer and a few trips over the road under his supervision are sufficient. Knowledge of the book of rules and of the significance of signals and train orders, experience in handling the air brakes and an intimate acquaintance with the route constitute at least nine-tenths of the qualifications of an efficient engineman. These are the same for electric and steam operation. Many division superintendents and mechanical officials have qualified hundreds of their steam enginemen to operate safely and successfully their most important trains with electric equipment, the time required per man not exceeding a week. Of course, the motorman, when first qualified, is not as competent as after a longer experience, but he can "safely and successfully" operate the most important trains.

In connection with records the report points out that numerous statistics relating to electrically operated roads have been published, including the cost of labor and material expended in repairs, and the efficiency of apparatus and maintenance methods as shown by the number of delays. Several of these statements use, as a basis for judging the efficiency of the equipment and its maintenance, the unit "miles per detention," and also the unit "miles per minute detention," but the majority of those published do not show the former item.

For the operating officials the unit, miles per minute detention, is of decided value, but this is not the proper basis on which to judge the efficiency of the apparatus nor of the force that maintains it, because the length of the delay is affected in most cases more by operating conditions than by the nature of the failure originally causing it. In three cases on one electrified road detentions due to broken tires were respectively thirty-eight minutes, sixty minutes and ninety-two minutes. Inasmuch as the length of the train delay due to this single class of failure varied from thirty-eight to ninety-two minutes, it makes the unit, miles per minute detention, of absolutely no use to the superintendent of electric equipment. The fact of importance to him and to those who are interested in the efficiency of the equipment is that the tires broke. Including the length of the delay only confuses matters. It appears to be advisable, therefore, to consider only the unit, "miles per detention," in connection with the records of the maintenance department.

It seems also to be desirable to subdivide the cause of train delays due to electric equipment under three general headings: "man failures," "electrical" and "mechanical." The headings "electrical" and "mechanical" are self-explanatory. The heading "man failures" is intended to cover failures of equipment which are due to the men operating it, and obviously this item should not be included in the statistics by which either the equipment or the force responsible for maintaining it are judged. However, man-failures should be included in the delay statistics for the benefit of the division superintendent and other operating officials.

Locomotive Headlights

Among the other committee reports which are of interest to the electric railways is that on locomotive headlights. This committee submitted a series of standards for use in connection with the incandescent lamp headlight, stating that the Columbus tests show that an incandescent lamp of approximately 50 mean horizontal candle-power will give sufficient light to meet the recommended maximum requirement of 3000 apparent beam candle-power.

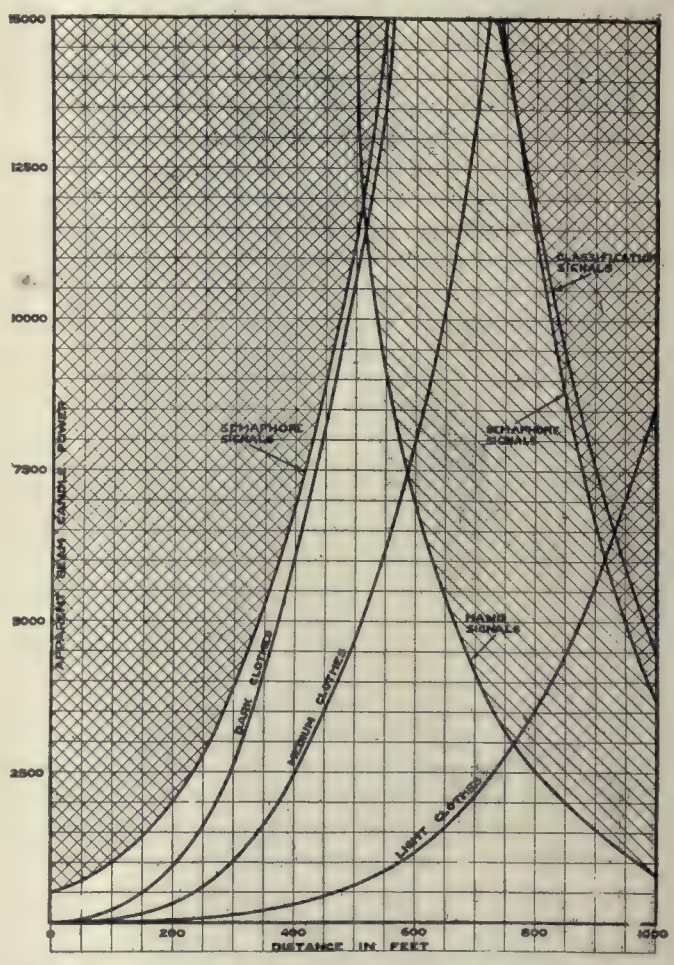
The proposed specifications therefor call for 50-cp, 7 volt, G-20 clear bulb, Edison screw bases (style 100), loop-back, tungsten filament, multiple-burning, headlight lamps. In case gas-filled lamps are used, the filament winding should be of such form and shape as to correspond closely with the form and shape of filament used in the lamp above described, and "gas-filled" must be specified when ordering. For use in cab, for markers, etc., 6-cp, 7 volt, G-10 clear bulb, double-contact bayonet candelabra base (style 100), tungsten filament, multiple-burning lamps are recommended. When metal reflectors are used, the minimum nominal diameter should not be less than 16 in. When parabolic glass reflectors or semaphore type lenses are used, the minimum nominal diameter should not be less than 12 in.

The report also contained details of a method of photometering, and a summary of headlight laws in the United States, together with a curve indicating the relations existing between arc and incandescent-lamp headlights. This showed that any object that may be seen with an arc headlight of 800,000 apparent beam candle-power may be seen just as readily with an incandescent-lamp headlight of only 100,000 apparent beam candle-power.

Another set of curves which was based on the Columbus tests is reproduced herewith. All of the curves indicating dangerous conditions, as referred to in the last year's report, have been reduced to a common scale and plotted on one sheet. The cross-sectioned space is the "danger" zone and the blank space is the "clear" zone. In selecting a safe headlight it is evident that its apparent beam candle-power value must lie within the limits of the blank space.

Other Reports

The committee on locomotive stokers stated that the past year's experience with the locomotive stoker strengthens the conviction that it is not only accomplishing its purpose but withstands the test of continuous service with remarkable durability. While it may be said that nothing novel has been presented during the past year, a great deal of very good work has



MASTER MECHANICS' HEADLIGHT REPORT—DIAGRAM SHOWING DANGER ZONES FOR POWERFUL HEADLIGHTS

been done along already established lines. The effort has been chiefly in the refinement of details. Watching the progress from the outside, one may be impressed with the thought that on the one hand there is fear of added complication, while on the other the fear that vital features may be disturbed. Still, simplicity is always desirable without the sacrifice of utility, each design is a study in itself, and efficient development can only be made by degrees.

The committee on smoke prevention conducted no new tests of smoke-preventing apparatus on steam locomotives during the past year, but received inquiries from several members relative to the improved methods and results concerning this problem in the city of Chicago. A brief description of Chicago methods was presented in the belief that the development of similar arrangements in other cities may be productive of equally good practical results.

Another year's use of the steam-air jets, quick-action blowers, etc., as recommended in the report to the 1913 convention, has further confirmed the belief that locomotives so equipped may be kept comparatively free from smoke, provided the engine crews are instructed

in the proper use of these devices and carry out such instructions at all times.

The feature of the report of the committee on forging specifications was the inclusion of a requirement for a proof test on all forgings "unless otherwise specified by purchaser." With this was a recommended table for heights of drop ranging from 1 ft. 3 in. on a 5-in. shaft to 33 ft. 9 in. on a 15-in. shaft, when a 1640-lb. tup is used. With a 2000-lb. tup these heights are, respectively, 11 in. and 24 ft. 8 in. For quenched-and-tempered carbon steel forgings up to 7 in. thick the elongation is specified at 2,000,000 divided by tensile strength with a minimum of 20.5 per cent, and with forgings from 7 in. to 10 in. thick the elongation is 1,900,000 divided by tensile strength, the minimum being 19.5 per cent. With quenched-and-tempered alloy steel forgings a diameter of 7 in. calls only for minimum elongation of 20 per cent, and for 7-in. to 10-in. forgings this is reduced to 18 per cent.

THE EXHIBITS

Diversity was, perhaps, the notable feature of the Railway Supply Manufacturers' exhibits at the convention. A number of track accessories were shown as well as apparatus only indirectly connected with locomotive and car maintenance, such as a speed-limiting device, tanks of oxygen for autogenous welding, calculating machines and the like. A total exhibit space of 70,000 sq. ft. was reported, the average space occupied by each individual exhibit being rather larger than the figure of last year.

Among the car coupling devices was shown a new-type M. C. B. coupler that had been subjected to a destruction test, the knuckle finally failing at a pull of 820,000 lb. by a break through the knuckle-pin hole. Another coupler had been subjected to a 500,000-lb. pull but remained in fully operative condition, showing that the new coupling devices have kept pace fully with the new locomotives having extraordinarily large drawbar pulls. An automatic connector for train-line and signal hose and electrical jumper cables was shown in operation, the device being hung under standard couplers that were brought together and separated to show the reliability with which the devices were latched and unlatched pneumatically.

A marked increase in the exhibits of 70-ton trucks indicates that the extra-large-capacity freight car is here to stay. The trucks were generally provided with cast-steel side frame, but one forged truck-side was made up throughout of steel-plate pressings. This tested to 300,000-lb. load on one truck side with a deflection of 0.7 in., and at the same time was subjected to 20,000-lb. transverse load, the transverse deflection being 0.1 in. Roller side-bearings were in evidence to some extent as an indication of the desire for flexibility, and none of the freight trucks shown had transoms, being held square only by the spring planks which were in most cases angles riveted to the truck sides.

The cast-iron wheels designed for use under the 70-ton cars were splendid examples of foundry work, the weights ranging from 750 lb. to 925 lb. for a 33-in. wheel.

The most striking novelty displayed among the track appliances was a "continuous rail-base," designed to take the place of tie plates and to permit the use of lighter rails and fewer ties by stiffening the construction. This rail base is rolled in lengths of from 8 ft. to 32 ft. as required, the sections being rigidly fastened together by toothed joints. The shape is that of a trough which has the sides flattened down at 2-ft. intervals, or at the ties, to give extra space for bearing as well as for the spikes. The rails rest in the trough and are held also by the spikes. At joints the joint plates are rigidly fastened to the rail base to prevent creeping of the rail, provision for expansion and contraction being made at the bolt holes.

There was shown also a steel tie which was perfectly insulated from the rail so that it could be used in automatic signal territory. The insulation is effected by a plate of fibre that rests on top of a block attached to the tie. On top of the fibre plate is an inverted trough-shaped tie plate, and the rail rests on this. The whole structure is held down by steel spikes driven into holes cored 4 in. deep in the block, these holes being lined with bushings of fibre ¼ in. thick. A spirally-split track bolt was also shown, the warped surfaces of the two halves providing a certain amount of elasticity that was stated to keep the nut from coming loose under vibration.

The value of the wedges for use with heavy castings was brought out in two devices, one a guard rail brace in which the lugs were held against the rails by wedges in a broad base, and the other an ingenious scheme for holding rerailers against the rail while the derailed wheels are moving up on them. The holding device, which can be used with any make of rerailer, consists of a bar-shaped malleable casting with one end bent over to catch onto the flange of the rail and with a sliding lug at the other end to fit against the base of the rerailer. The lug is wedged tightly in place by a flat wedge sliding between the moveable lug and a stationary lug at the end of the casting. The casting, it may be said, is bent slightly so that by pressing down on the end outside the rail the end at the inside is raised and can be caught on the rail flange, thus eliminating any necessity for going underneath the car.

The all-steel box car also was in evidence in one of the exhibits. This had flat steel-sheathed sides and corrugated ends, the roof being of wood supported on steel carlines. The interior sheathing and floor were of wood. The capacity was 100,000 lb., the length inside being 40 ft. 8 in., and the weight was 45,900 lb.

Among the other novelties displayed was a sliding guard for parcel racks in passenger cars. This is put up in pairs either one of which slides past the other when it is desired to get access to the rack, and as the guard is attached by brackets it can be easily installed on old equipment. Self-lubricating bearing metal in which the lubricant was contained in the alloy itself was also shown. The exhibition of several sanding devices showed that the problem of getting sand on the rail with certainty and economy was still a live issue. One device made an ingenious application of the almost obvious plan of introducing air in the discharge pipe just beyond the sand chamber for the purpose of cleaning out the pipe by air from time to time, preventing it from freezing or clogging up. A ball joint for pipes was shown as a competitor for steam-heat hose and air hose. This was made up with a special composition gasket on a brass ball, the gasket being good for a life of about 100,000 car miles and being replaceable at a cost of about 15 cents, with a working movement of 18 deg. each way from the centerline.

Forty-one pupils representing six schools rode free on the Knoxville Railway & Light Company cars, each having been presented with a book of fifty car tickets for their best essays on safety-first topics. The company renewed its offer for May and distributed blotters with lists of subjects, and illustrations, from which the teachers in the various schools selected topics for the essays. Needless to say, the company had the hearty co-operation of the teachers in the competition.

Manganese Steel Track-Work Specifications

The joint standardization committee of the Manganese Track Society and the Manganese Steel Founders' Society has issued booklet of standards No. 5 containing specifications for manganese steel track work for steam railroads. Since these specifications will no doubt form the basis of those for manganese steel special work in paved streets, the essential features are presented.

Regarding the general condition of the castings, the specifications require that they shall be free from such blow holes, sand holes, cracks, cold shuts and other defects which may impair the serviceability. Castings must also be out of twist and reasonably true, both as to general surface and alignment, and must not show any signs of straining or undue denting as a result of the straightening process. Tread surfaces within 2½ in. of the gage line and the side of the groove 1 in. down from the tread must be free from physical defects of all kinds, unless they are so small that they may be removed in finishing the casting. Castings must also be free from shrinkage cracks running vertically in the web members of solid work, or horizontally at or near the ends or in the corners at the junction of projecting members, or longitudinally in grooves.

Shrinkage cracks that will not materially weaken a casting are acceptable but must not exceed ¾ in. downward across the tops of guards. Cracks are considered acceptable that do not exceed half the width of the bottom flanges of solid work and which do not extend up more than ¾ in. from the bottom of vertical members in railbound work. Cracks in the bottom of the groove transversely and not extending beyond the lower fillet, and horizontal cracks in the web members, not at or near the ends, will pass inspection. Exception to these rules is taken where two cracks are close together or nearly opposite on the two sides of a casting. Repairs to cracks with an electric welder are not permitted on the running surfaces, but imperfections on the other parts which do not affect the strength may be welded to improve the appearance.

These specifications also provide that the running surfaces shall be finished in practically the same manner as rolled rails, variations from true level of not more than 1/16 in. in 5 ft., and not more than ⅛ in. in the total length of the structure, are permitted. Where the side of the casting lies up against the rails a fit with a 1/16-in. tolerance is required. Grooves must conform to the Manganese Track Society's standard contour with tolerances permitting them to be 3/16 in. deeper but not more than 1/16 in. shallower. Tolerances at joints provide that when they are bolted up tight the rails shall line correctly with the casting, with no greater variation than 1/32 in. in either line or level. The bottom parts of castings that rest on ties must be reasonably straight, with no greater variation than ⅛ in. in 5 ft. from the true plane, and shall be free from other imperfections which would prevent a good bearing.

Other tolerances provide for variations from the given dimensions in the gage lines not to exceed 1/16 in., the over-all lengths not to exceed ⅛ in. under size to 1/16 in. over size. In special frogs and crossings a variation of ⅛ in. short or 3/16 in. long for each 10 ft. in length is allowed, and in cases where two or more pieces connect these tolerances apply for each 10 ft. of combined length. The tolerance in the spread of angles permits frogs and crossings to be ⅛ in. wide or narrow between gage lines at the extreme ends of the arms. The gages in crossings may also be ⅛ in. wide or ⅛ in. narrow. The spacing of fish-plate holes in solid frogs and crossings is allowed to vary ⅛ in., either vertically or horizontally and on railbound work not more than 1/16 in. variation is permitted. The size of the holes in solid manganese steel work is required to be not more than ⅛ in. over size in solid work and not more than 1/16 in. over size in railbound work.

Overhead Construction in the Philadelphia-Paoli Electrification

An extended account of the equipment for the electrification of the main line of the Pennsylvania Railroad from Philadelphia to Paoli was published in the ELECTRIC RAILWAY JOURNAL for April 18, 1914, and an article on the method of training the enginemen for train operation appeared in the issue for May 22, 1915.

CONSTRUCTION GANG ON PHILADELPHIA-PAOLI ELECTRIFICATION STRINGING WIRES WITHOUT INTERRUPTING TRAFFIC

In a recent statement issued by the company the cost for the equipment of this line, 20 miles in length, is given as $4,000,000, or at the rate of $200,000 per mile. Undoubtedly this expense was due in considerable part to the difficulties of performing this work without interruption of traffic. Through the six track approach at the first interlocking tower west of Broad Street Station, Philadelphia, where sixty-five switches and fifty-two signals are located, no less than 2295 separate movements of trains and engines occur daily, and means had to be devised by which the construction gang could work without interruption to this immense traffic. In all the work of electrifying this 20 miles of railroad included the stringing and restringing of 660 miles of electric wires, the erection of 760 poles, thirty-six signal bridges and four substations, and the installation of a wholly new type of automatic block signal system. In this system all moving parts have been eliminated, the semaphore arms being replaced by a series of electric lamps so arranged that their position indicates the horizontal, diagonal or vertical position which would be taken by the semaphore arm.

The accompanying illustration shows the method followed in the erection of the overhead wires. Strong scaffolding, erected on flat cars, was used to get the men up to the level of the wires with which they were working, and large gangs of men were employed in order that they could work very quickly during the limited time they were permitted to occupy a track in this manner. The view shows a train just pulling into a station with the electric workers busy overhead.

COMMUNICATIONS

A. C. Testing of Railway Motor Insulation

NEW YORK MUNICIPAL RAILWAY CORPORATION

BROOKLYN, N. Y., June 8, 1915.

To the Editors:

I have noted the editorial on testing motor insulation which appeared in the issue of the ELECTRIC RAILWAY JOURNAL for June 5. In this connection I firmly believe that the recommended practice of the A. E. R. E. A. for trolley roads, specifying 2500 volts alternating current for five seconds on new armatures and fields and 1000 volts alternating current for five seconds on old armatures and fields, is entirely proper and desirable, where there is severe service placed upon the equipment and reliability in service is one of the main factors.

Of course, this is quite a high standard for maintenance and repair of old equipment, but I am firmly convinced that it is absolutely necessary where it is essential that cars be kept on the road, and this test should be applied to all motors, at definite periods, depending upon the class of service in which the equipment is operated.

I do not believe it to be a fact that the insulation is unduly strained by these alternating current tests when they are properly applied and when the above voltages used, as there should always be a sufficient margin of safety in the insulation of both armature and fields to withstand the continued shocks from voltage surges, and weaknesses due to abrasion, moisture, etc., from various causes will be thereby picked out and the proper safety factor maintained.

WM. G. GOVE, Engineer of Car Equipment.

Flange-Bearing Special Work

UNION TRACTION COMPANY OF INDIANA

ANDERSON, IND., May 27, 1915.

To the Editors:

Your editorial in the issue of May 8 on flange-bearing special work was very interesting, and I believe is in line with the best practice of to-day. Flange-bearing special work is increasing the life of special-work pieces, and by using the welder the life of these pieces may be prolonged considerably. The length of the approach in the special-work flangeway or the rate at which the flangeway rises to its maximum height, however, is a question which is just as important as the flange-bearing. The flangeway should be smooth, and the rate at which the flangeway rises should be uniform. In using the welder it is very easy to get a rough surface, in fact, a rough surface will be obtained, and grinding is necessary to make it smooth. The hand grinding which is necessary makes a uniform rate of rise rather difficult to obtain. It is possible, however, to obtain this uniform rise by constructing a templet with the desired slope, upon which the hand grinder can slide. If this is done the welded material can be ground to a smooth and uniform bearing surface.

Probably most of the trouble attributed to raised flangeways from the standpoint of chipped wheels has been due to a too rapid rise in the flangeway. The heavy blow struck on account of too steep an incline will, I believe, prove as injurious to the special work as to the wheels. I believe that the rate of rise should be not more than 1/32 in. vertical to 1 in. horizontal. In cities where both interurban and city cars are operated and where the depth of wheel flanges differ it may be difficult to decide which flange should have the bearing in special-work pieces. Of course, if the city car wheel flanges have the bearing the interurban car flanges will also ride. The treads of the wheels, however, will be raised from the ball of the rail by the difference in the depth of the two flanges. At the rate of incline above mentioned I do not believe that interurban car wheels would be injured. In cities of from 20,000 to 50,000 inhabitants I believe that it would be sufficient to raise the flangeways to take care of the interurban car wheels only, provided both types of cars are operated over the special work. This question must be decided on the basis of local conditions, but in general we should have raised flangeways.

L. A. MITCHELL, Superintendent of Roadway.

Traffic Characteristics and Investment per Revenue Passenger

FORD, BACON & DAVIS

PHILADELPHIA, PA., June 1, 1915.

To the Editors:

Traffic surveys are not expensive. It is not always possible to show that they produce direct financial results, but they enable a manager to say "I know" instead of "I think." In these days a man is not covering his job unless he has examined every possibility of improvement. And even if a method or a disposition is right or best, he must know that it is so and prove it so far as it can be proved.

Besides the obvious immediate value of a traffic survey in making schedules, its usefulness extends to routing, transfer regulations, choice of economical size of car, determination of value of fostered traffic and to restraining demands for extensions of lines when not warranted by the density of travel.

The net and surplus earnings of street railways represent the final answer to the transportation problem which involves a great many operating conditions or factors. The variations in these factors from year to year have curiously balanced one another so that for twenty-five years we have been able to carry passengers under vastly changed conditions at the same nominal rate of fare. Thus:

Raises in wages which seemed overwhelming have been balanced by gains in efficiency of apparatus and management.

Increases in length of haul have been balanced by increased density of traffic.

The relentless decline in net earnings per passenger has been balanced by the increase in number of passengers per unit of investment.

Of late years this comfortable equilibrium has been rudely disturbed. If a company cannot wait upon its nominal increase in density to restore its balance, there are only two remedies, namely, still greater efficiency and higher rates of fare. In efforts to apply both of these remedies, the traffic survey will help. Its usefulness in the promotion of efficiency has been mentioned. Gains in efficiency are not easily made at this stage of the art, but increases in fare or even hopes of increases are much more elusive.

A traffic survey may substantiate several good arguments for higher fares, but principally it gives accurately the average length of ride.

The fare question ought to be settled ultimately on a logical basis, due weight being given to length of haul and density of travel. Correct fare zones are not necessarily circular but bulge where density is high and draw in where density is low. A plea for a higher fare on a given line should be backed up by proof that the favorable factor of density does not overbalance the burden of the long car trip or the long average ride per passenger.

The service performed by a street railway may be defined or described as follows:

(1) During the rush hours it provides the necessary

number of passenger spaces at the point of maximum loading in the direction of heaviest loading. Whether a passenger rides a long or short distance, this passenger space must make a round trip over the designated route of the line in order to furnish the passenger space required at the point of maximum loading in the heavy direction. This portion of the service therefore consists of "passenger space miles."

(2) During the period between the morning and evening rush hours, sufficient seats must be provided at the point of maximum load. These seats must be moved over the designated route of the line whether they are occupied or not. This portion of the service therefore consists of "seat miles."

(3) Before the morning rush and after the evening rush, schedules are generally governed by headways mandatory or practical. This means that cars large or small must be passed over designated routes at certain intervals. This portion of the service therefore consists of "car miles."

The street railway man's general problem is to find the routes, schedules and types of equipment which will perform these varied duties most efficiently. The writer is of the opinion that it would pay to order our accounting system so that the cost of service of each character can be determined without too much analysis and calculation. One of the results of such an analysis of the cost of service would be to shatter the mistaken and harmful notion that strap-hangers pay the dividends. Electric light and power people discovered long ago that the customer who uses electricity only at the peak is expensive and undesirable. It is not hard to show that business does not pay which requires the purchase of equipment for four or five hours' use out of twenty-four hours and then to carry a load, however large, in one direction only.

If street railways did not already have their rush hour equipment on hand, with interest charges accruing on it, they might not find jitneys an unmixed evil. For if jitneys thrive at all, they do so during the rush hours. In many cities the track capacity of some streets is already reached during the rush hours. In such cases the fixed charges on track must be figured against the peak load, and this gives rush hour traffic a considerably worse financial aspect.

Referring to Mr. Doolittle's very interesting and comprehensive outline of his subject and plan of treatment, the models will be worth while if they have a definite purpose in giving specific instruction to traffic men, or in demonstrating to and impressing on the public mind the relation of service to traffic. Diagrams seem better than models for this purpose, but anything which helps in any way is welcome.

The writer would suggest that "traffic factor" and "service factor" would be preferable to "concentration index." The former terms correspond to the well known and accepted "load factor" in central-station work.

Not with the intention of anticipating Mr. Doolittle's conclusions regarding standard methods of procedure for traffic surveys, the writer would state his belief that the destination count as made in Philadelphia is entirely practicable for any city. It can be made complete with all compilations at a cost of not over $30 per car counted. It gives information which can be confidently relied upon in questions of routing and transfer regulations. Unless a city is growing or changing very rapidly, the information obtained by such a count should be useful for five years or more.

The ratio of investment to gross revenue has undoubtedly been overworked and misapplied, but the writer is not favorably impressed with Mr. McGrath's suggestion that the "revenue passenger" be used generally as a basis of comparing investments. This unit would correspond to the "kilowatt hour" in central-station work, and we know that no electrical man would consider figuring his investment per kilowatt hour. While the demand costs are not so large a proportion of the total in railway as in central-station service, they are nevertheless very important, and nobody desires to belittle them. We want to make the rush hour passenger realize that the investment necessary to carry him when he wants to travel is greater than that required for the non-rush passenger, even though the former sometimes gets only standing space.

For railway and financial people the cost per mile of track is the most useful presentation of investment. The cost per mile of track varies principally with the amount of equipment necessary per mile of track, and with the general character of construction. Both of these factors vary directly with the density of traffic and, therefore, with each other. So that if we know the maximum number of forty-seat cars required per mile of track we have a direct line on the cost of equipment and, indirectly through the density, a measure of the average character of construction required. It is true that at present the maximum number of forty-seat cars—or an equivalent unit—is recorded for very few railways. It is a simple figure to compile, however, and it undoubtedly will be taken up in the future as it shows the important element of demand. The cost per mile of track for systems having various numbers of cars per mile of track could be platted on a simple diagram and a reasonable basis for judging any other property obtained. It goes without saying that any unusual conditions should be taken into account.

In the absence of the maximum number of forty-seat cars or an equivalent demand unit, a fairly satisfactory basis of comparison can be had by using the car miles per mile of track. This has the disadvantage of not taking account of load factor or size of cars.

For use before the public, the investment "per capita" would seem to carry more weight and to be more appropriate than the investment "per revenue passenger." A resident of a city, for example, would obtain a better idea of the street railway problem if he thinks of the company's investment in his service as $75 rather than as 30 cents for every time he rides.

J. A. Emery.

Safety First in Manila

The Manila Electric Railway & Lighting Company, Manila, P. I., has taken up the safety-first propaganda, and, under the direction of C. Nesbitt Duffy, vice-president, with the active assistance of his department heads, the company has inaugurated a safety-first campaign. The matter was first considered at a meeting of the company's officials and department heads on June 26, 1914. A few days later a safety committee was appointed, consisting of twelve departmental heads not officials of the company. The executive committee was composed of C. H. Van Hoven, who is the claim agent; Oscar Keesee, superintendent of transportation, and Ramon Lopez, superintendent of distribution. Lectures have been given in the public schools by C. H. Van Hoven in English, and by F. P. Santiago in Tagalog. Circulars in English and in Tagalog have been sent to cocheros, chauffeurs, owners of automobiles, garages and livery stables. Placards or posters have been placed in the cars operated by the company. According to Mr. Duffy 1512 accidents were reported in 1914. Of this number 610 were caused in boarding or alighting from cars, while 646 were caused by collisions with vehicles. These two forms of accidents were 85 per cent of the total reported. C. H. Van Hoven is in general charge of this movement.

Equipment and Its Maintenance

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

(Contributions from the Men in the Field Are Solicited and Will be Paid for at Special Rates.)

Northern Texas Traction Weed Cutter

BY R. E. GRIFFITHS, NORTHERN TEXAS TRACTION COMPANY, FORT WORTH, TEXAS

To reduce the expense of cutting weeds and grass on its right-of-way the Northern Texas Traction Company has built the weed cutter shown in the accompanying illustration.

An ordinary flat car was utilized for the weed cutter, a revolving wire brush being mounted from the truck at one end. The core of the brush or cutter consists of a 1½-in. shaft revolving in bearings mounted directly over the rails and carrying at the center an 8-in. driving pulley. Except in the pulley and the bearings the shaft is drilled with holes on half-inch centers, adjacent holes being at right angles to each other. Wire strands are mounted in the holes, each consisting of a piece of

WEED CUTTER IN USE BY NORTHERN TEXAS TRACTION COMPANY

strand from a 1¼-in. switch cable. This strand is made up of seven No. 10 wires and it is raveled for 4 in. from each end, further ravelling being prevented by a wrapping of wire.

The shaft revolves in simple bearings carried on brackets attached to the side frames of the truck, the upper member being formed of 1-in. x 4-in. flat steel and the lower member of ¾-in. x 3-in. flat steel. A tie-rod serves to brace the brackets sidewise. The cutter is driven through a flat belt from a 22-in. pulley on the rear axle of the truck and makes about 900 r.p.m. when the car is running at 30 m.p.h.

In operation the car is run ahead of the motor car, with the cutter in front. With the belt uncrossed the bottom of the cutter moves backward with respect to the car motion, which is the normal arrangement. The direction of rotation of the cutter can, however, be reversed by crossing the driving belt. It is only necessary to run the car over the road once to cut down all grass and weeds even with the top of the rail, excepting those directly under the driving pulley. There is no particular objection to leaving the weeds in the center of the track as they cannot be ground under the car wheels.

The Three-in-One Car

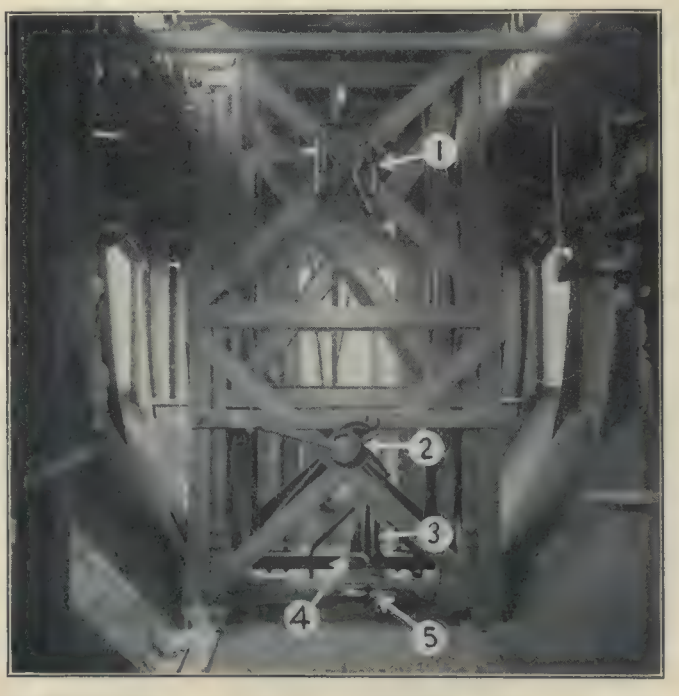
BY E. C. SHERWOOD, SUPERINTENDENT OF EQUIPMENT MANHATTAN & QUEENS TRACTION CORPORATION, LONG ISLAND CITY, N. Y.

THREE-IN-ONE CAR—FIGS. 1 AND 2, PLATFORM IN RAISED AND LOWERED POSITIONS RESPECTIVELY

This company recently decided to remodel an old single-truck passenger car into a line car at a minimum of expense. In doing so it was found possible to design the car so that it would act as a snow scraper and an arc-welding outfit also. The car was built and has proved very satisfactory, becoming known among the employees of the company as the "three-in-one" car.

THREE-IN-ONE CAR AS A LINE CAR

The car available measured 31 ft. 6 in. over bumpers, 7 ft. 8 in. in width and 11 ft. 5 in. in height. In remod-



THREE-IN-ONE CAR—FIG. 3, INTERIOR VIEW, SHOWING TOWER FRAMES, GUIDE SHEAVES, ETC.

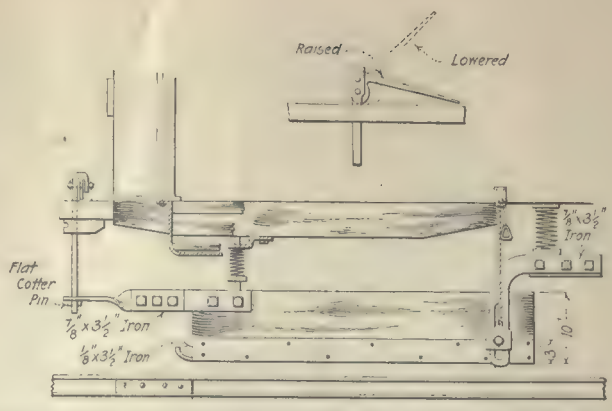
eling, the two longitudinal seats and the heaters were removed. The cables were then pushed back against the sides and covered with a protecting boarding of tongue-and-groove flooring, running diagonally from the bottom of the sash to the car floor. This arrangement left ample space for the new purpose. One end of the car from door-post to corner-post was removed and so arranged that it could be replaced and held in position by means of hooks. This opening provided ample room to admit a reel of cable or trolley wire. As a guide for the tower a frame consisting of four upright posts, 3-in. by 3-in. in size, was built between the floor and the corners of a hole 42 in. square in the roof. The posts were cross-braced and bolted both to the floor and the roof. The sliding tower is a frame made of four uprights, 2½-in. by 3-in. in size, suitably cross-braced. On top a fifth wheel was arranged to swing the platform, which is about 5 ft. x 8 ft. in size.

When the tower is down the platform fits close to the roof and must be raised 3 or 4 in. before the platform can be swung out. There is therefore no danger that it will swing out when the car is in motion and the tower is down, and no clamp is necessary to hold the platform in position. The tower is raised by means of a winch, cables being fastened at the bottom of the uprights and running over sheaves which are set in the cross-pieces fastened in the opening of the roof. The platform is provided with hinged railings at the side, held in place by diagonal hooks when in use and folded flat on the platform when not in use. The platform is shown in Figs, 1, 2 and 4.

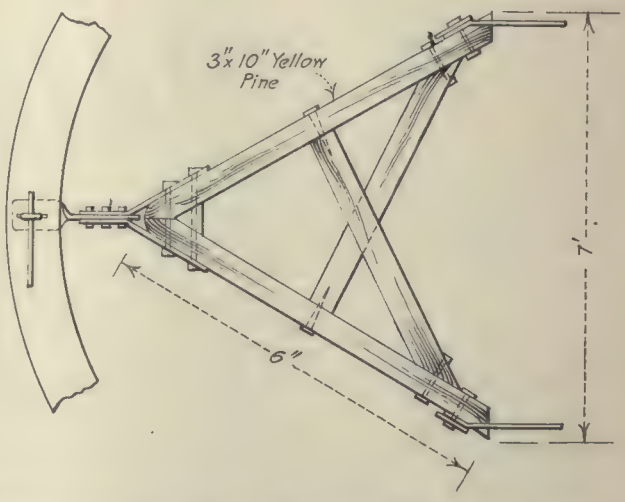
The arrangements for stringing trolley wires are as follows: A rack inside the car supports the reel. From the reel the wire passes between a pair of 5-in. sheaves (*5*, Fig. 3), mounted on the bottom of the tower, through a tension clamp (*4*, Fig. 3), around a 16-in. sheave (*3*, Fig. 3) with a 2-in. by 1-in. groove, through the tower platform (Fig. 4) and out over a 16-in. sheave with a 2-in. by 3-in. groove. The tension clamp (*4*, Fig. 3) consists of two pieces of flat iron, grooved to fit the wire and shod with fiber to prevent chafing of the wire. The lower piece is fastened to the bottom of the tower, and the upper piece is raised and lowered by means of a threaded spindle. The side-by-side arrangement of 5-in. sheaves furnishes a guide for the wire no matter what its direction may be in coming from the reel. These sheaves also take any kink out of the wire. The platform sheave has a wide, shallow groove so that the wire can shift from side to side.

After the trolley wire has been fastened or anchored all that is necessary is to raise the tower to the desired height, set the tension clamp, and start the car, when the wire will be paid out perfectly straight and free from kinks. The wire can be run without pulling or lifting, and as everything connected with the tower is

THREE-IN-ONE CAR—FIG. 4, PLATFORM OF LINE TOWER



THREE-IN-ONE CAR—FIG. 5, DETAIL OF LEVER AND CAM; FIG. 6, SIDE ELEVATION OF SNOW SCRAPER



THREE-IN-ONE CAR—FIG. 7, PLAN OF SNOW SCRAPER

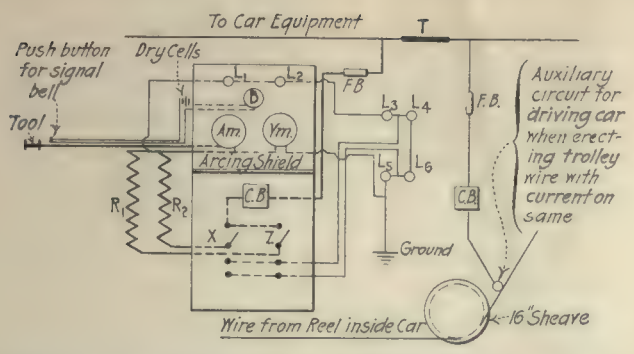
insulated the wire can be strung alive. As the wire inside the car is alive we made good use of this fact by tapping off the trolley base, running a lead to a circuit breaker (*1*, Fig. 3) located on cross-braces of the tower guide frame, thence to a trolley wheel back of the 16-in. inside sheave. This wheel makes contact with the wire coming off the reel. Thus by pulling down the trolley pole and closing the circuit breaker the car can be operated from the current drawn through this wheel. This is very convenient in stringing trolley wire where the track is laid but where no trolley wire has been placed.

In addition to the trolley-stringing apparatus the car contains a work bench, a hand drill-press, an emery wheel, a vise, bins for supplies, etc. This equipment makes the line force more or less independent of the shop and saves time waiting for drilling, etc.

Three-in-One Car as a Snow Scraper

In order to increase the usefulness of the car, which was not in constant demand as a line car, it was equipped with snow scrapers of the type shown in Figs. 5, 6 and 7. Applications have been filed for patents on this type of scraper, which has proved very satisfactory in operation. It consists of a plow made of 3-in. by 10-in. lumber and shod with ⅛-in. by 3½-in. band iron at the bottom to take the wear. The plow is 6 ft. in length and 7 ft. wide at the back. The nose is rounded, and from the bottom of the nose an upward-curving toe projects to prevent catching on obstructions.

At the heel the plow is held in position longitudinally and sidewise by means of bolts which slide in slots in brackets attached to the truck frame. By cutting out three rivets on each side of the truck on both ends it



THREE-IN-ONE CAR—FIG. 8, WIRING DIAGRAM OF ARC-WELDING OUTFIT AND AUXILIARY CIRCUIT

was possible to bolt on the flat brackets as shown in Fig. 6. These are made of ⅞-in. by 3½-in. flat iron and are bolted firmly through the rivet holes. The slots permit the heel of the scraper to rise and drop when riding over high spots on the road.

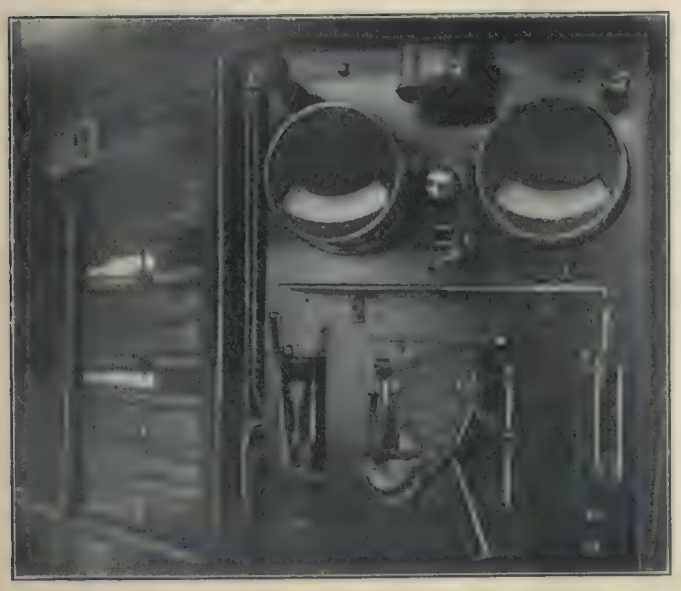
At the nose a coiled spring under the platform presses the plow downward and an extension made of ⅞-in. by 3½-in. flat iron projects outward to a point under the car drawhead for the purpose of supporting it on a rod which hangs from the bumper. This rod passes through a hole in the extension and a flat cotter key through it takes the weight of the front end of the plow. The rod passes up through the bumper and is bent over at the upper end to form a bearing for a cam-ended lever, by means of which the plow nose can be raised and lowered. At the heel chains are provided for raising the rear of the plow when it is out of use. The chains are hung over split hooks.

THREE-IN-ONE CAR AS AN ARC-WELDING OUTFIT

For the purpose of using the car as a welding outfit suitable resistance boxes were provided, a switchboard with measuring instruments was installed and provision was made for the necessary signals between the welding men and the switchboard operators.

There are four resistance boxes made up of regular car resistance grids, each measuring 42 in. in length. They are mounted on two 2-in. by 4-in. uprights running from the floor to the roof of the car, three being placed horizontally and one vertically. By the use of this method of mounting, a space 37-in. by 52-in. by 26-in. only was required.

Current for welding is taken from the trolley base through a fuse box from which the fuse is removed when the welder is not in use. From the fuse box the line runs to a circuit-breaker on the switchboard, then through two operating switches to the resistance boxes and the ammeter and through a conduit out over the truck to the outside of the car.



THREE-IN-ONE CAR—FIG. 9, SWITCHBOARD FOR ARC-WELDING OUTFIT

The ammeter referred to has a capacity of 400 amp, and a 700-voltmeter is also supplied on the switchboard. On the board are also a signal bell operated by a push button on the handle of the welding tool, and signal lamps for indicating the condition of the circuit.

The terminal of the wire from the trolley has sweated on it one-half of a two-way clasp connector, and the lead wire connecting to the welding tool has the other half of the connector sweated on it. The ground wire from the truck of the car is similarly equipped.

In using the car in welding, the welding tool is connected up to the terminals either on the positive or the negative side as is desired, and the workman when ready to start welding signals the switchboard operator who closes the circuit-breaker. This lights up two indicating lamps located under the drip rail of the car on either side, and two others on the switchboard indicating that power is available. The outside signal lamps are so connected that when either one or the other of the resistance switches, *X* and *Z* in the accompanying electric circuit diagram, is thrown down, short-circuiting the auxiliary contacts, one outside lamp on each side of the car is extinguished. This indicates to the welder the amount of current which he may expect to get. The welder is able to signal for full current, half current or no current by means of the signal bell, and to know that the switchboard operator understands his signals. All of the electrical connections described are indicated in the diagram. By the arrangement described welding on overhead work can be done from the raised platform just as well as welding on the ground.

Cooling Plant at Bluestone

Some additional facts in regard to the cooling plant used in the power station of the Norfolk & Western Railway at Bluestone, described last week, and supplied by the Spray Engineering Company, Boston, may be of interest. The pond is used when the supply of river water is low or too muddy for boiler use, the water then being sprayed into the pond and then discharged into the intake canal. If there is sufficient cooled river water of suitable quality, the water from the condensers is not sprayed but is discharged into the pond from which it is allowed to flow into the river reservoir several hundred feet below the intake and circulates upstream to the intake, the complete circuit being about 1400 ft. The pond is 90 ft. wide, 296 ft. long and 5 ft. deep, and the basin is formed of a concrete retaining wall and an 8-in. bottom, laid on rolled ground. The basin may be drained by a sluicing gate.

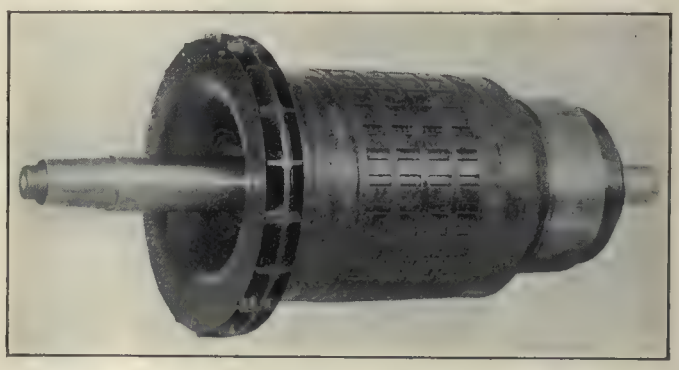
The nozzles and pond are fed by three 24-in. pipe lines from the power station. There are four rows of concrete piers supporting branch arms, each carrying three or four sets of spray brackets. Altogether, there are 280 nozzles with space for 140 more. At the end of each of the four main branch lines is a bronze release valve arranged to open automatically when the water pressure exceeds a predetermined value. The valves discharge downward on concrete slabs which prevent the erosion of the basin bottom. With the exception of the 2½-in. wrought iron spray brackets, all piping is of cast-iron, painted inside and out with tar pitch varnish. The nozzles are of bronze and are designed each to discharge 62 gal. per minute with a nozzle pressure of 5 lb. per square inch. The pond is capable of cooling 16,800 gal. per minute.

GE 240-C Motor and PC-2 Control

Information is now available of the GE 240-C motor and the PC-2 control with which six of the cars to operate through the Belmont tunnel in New York are equipped. This line, which is controlled by the Interborough Rapid Transit Company, though not now physically connected with the existing subway system, runs from Forty-second Street, Manhattan, at a point midway between Lexington and Third Avenues to Jackson Avenue in the Borough of Queens. The distance is about 6680 ft. Of the twelve cars six are being equipped with the 240-C motor and PC-2 control of the General Electric Company and six with the 302-F-2 motor and 214-A control of the Westinghouse Electric & Manufacturing Company.

The GE 240-C motor is a recent design of the box type with nose for motor support cast integral with the frame. Its weight complete, with gear, gear case, pinion and axle linings is 4000 lb. A high continuous capacity is obtained by the use of the General Electric Company's system of double or multiple ventilation. A fan that has two sets of blades and that has a greater diameter than the armature, is made integral with the pinion-end armature head. Hooded openings are provided in the commutator end-frame head for the entrance of cooling air. As the air enters it divides into two parallel streams, one passing around the field coils to the fan, the other being drawn through the commutator shell and the armature core. The streams unite after passing through the fan and are exhausted to the atmosphere through openings provided in the frame. Air at atmospheric temperature is thus introduced almost directly into the armature core, effectively cooling it and largely increasing the service capacity of the motor.

BELMONT TUNNEL EQUIPMENT—MOTOR ASSEMBLED COMPLETE



BELMONT TUNNEL EQUIPMENT—MOTOR ARMATURE WITH MULTIPLE FAN

The control furnished with the motors is the Sprague, G. E. Type-PC-2 multiple-unit electro-pneumatic type, the apparatus consisting in general of two parts, a main or motor controller located below the car, and a master controller which regulates the operation of the motor controller.

The motor controller is a series-paralleling group of ten switches or contactor units, a reverser, two line breakers, overload, potential, and current limit relays, all assembled in a single case. The series-parallel connection of the motors is accomplished by the "bridge" method, the circuit through the motors not being interrupted during the transmission from the series to the parallel connection. The tapped field motor permits the use of a heavy accelerating current on full field, and a higher armature speed on tapped field, and in addition allows one resistance step to be cut out, the motors operating on tapped field on both series and parallel with a saving in rheostat losses. The contactor units making the different electrical combinations for the motors are closed mechanically by means of cams mounted on a shaft which is revolved by a rack and pinion. The rack is operated by two air cylinders whose valves are electrically controlled by the master controller.

The construction of the contactor units will be understood from the view of one that is reproduced. To close the circuit a cam engages with the roller mounted on the lowest part of the hinged arm, and raises it until the contact surfaces come together, at the same time compressing the spring. When it is released, the spring returns the arm to its original position, thus breaking the circuit. The unit is of rigid and substantial construction, and special attention has been given to interchangeability of parts. The contactor is self-adjusting, the spring automatically taking up any wear.

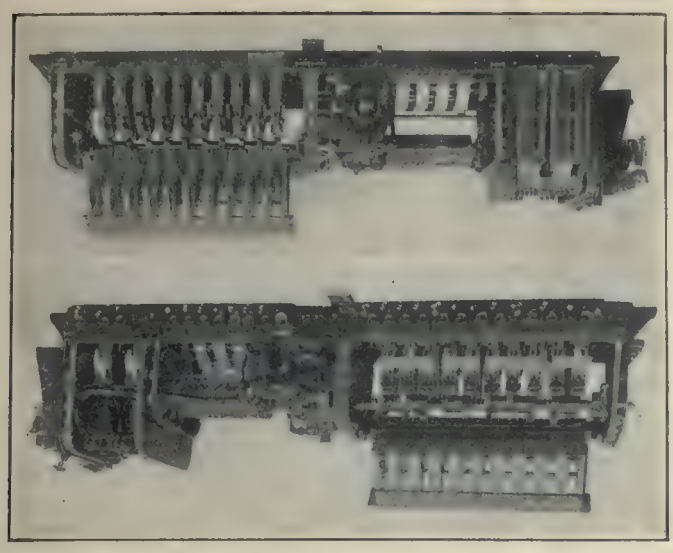
All of the contactor arc chutes are grouped in one unit similar in construction to that used in the ordinary drum controller. This unit is suitably hinged so that it may be swung downwards, thereby exposing all of the contacts and operating mechanism of the contactors. Individual side burning plates are used in the arc chute, and these can be readily removed by releasing a simple spring catch.

The rack that controls the position of the cam shaft is mounted between two air cylinders. The valves controlling the admission of air pressure to the cylinders are controlled by the master controller.

The line breakers are also operated pneumatically and controlled electrically. In construction, they are similar in principle to the contactor units. In operation a movable arm carrying a removable copper tip makes contact with a similar tip. The arm is lifted to close the circuit by an air cylinder the valves of which are directly operated by the master controller each time it is turned on or off. When the control circuit is interrupted air is exhausted from the cylinder and a strong spring, together with the weight of the arm, causes it to drop, and open the power circuit. An overload trip is provided for the line breakers so that an excess current will cause the main current to be broken. The reverser is also actuated by air pressure, and is electrically controlled for throwing it into either position.

Current for operating the control circuits is furnished by a storage battery at a potential of 32 volts. This is charged in series with the air compressor whenever the latter is in operation. Air pressure for the cam shaft cylinders, line breakers and reverser, is obtained from the air brake system.

The master controller is similar in general construction to that used with the Sprague G. E. Automatic Type-M control, and consists of a single cylinder which energizes the various train wires for forward or back-



BELMONT TUNNEL EQUIPMENT—FRONT AND BACK VIEWS OF MOTOR CONTROLLER, WITH ARC CHUTE LOWERED

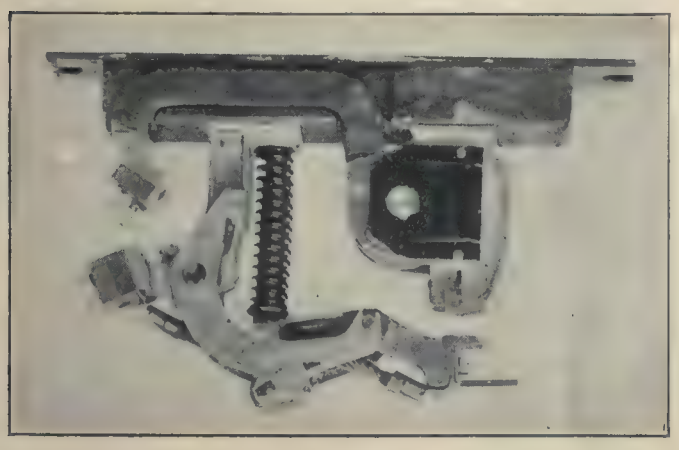
ward movement. The handle is moved in one direction for forward car movement and in the opposite direction for reverse.

There are four positions for forward movement: Switching point in series; accelerating point in series; lap point in parallel; accelerating point in parallel. There are but two positions in the reverse direction corresponding to the first two mentioned for forward motion. Switches are also provided for the control-circuit cutout, and line-breaker reset.

When the controller handle is turned to the switching position, all reversers in the train are first thrown for whatever car direction is indicated on the controller in use. The circuit controlling the operation of the line breaker is next established. To insure a correct sequence of operations the line breaker is not allowed to close and complete the motor circuit until the reverser has thrown to the proper position.

When the handle is moved to the accelerating points, the train accelerates automatically at a pre-determined current per motor. A current-limit or notching relay limits the accelerating current and stops the rotation of the cam shaft when the pre-determined current is reached. When the motor current drops to the correct value the progression is again started.

The controller handle is automatically returned to the off position by a spring so that power is cut off whenever the motorman releases his hold. The release of this handle permits a knob to rise and thereby actuate a small air valve in the controller for applying the brakes simultaneously with the cutting off of power.



BELMONT TUNNEL EQUIPMENT—CONTACTOR UNIT FOR MOTOR CONTROLLER

These two features are provided for the purpose of bringing the train quickly to rest in case the motorman becomes incapacitated. In the event of the line breaker opening, due to an overload, the motorman re-establishes the closing circuit by operating the resetting switch in the cab.

The special features of the new control are reported as follows: A definite sequence of contactor operation is established both when going off and on, due to the mechanical control of the contactor units, and this prevents trouble that might occur from improper functioning of independently operated contactors. Interlocks on the contactors are eliminated. The electric control circuits are simple. The simplicity and compactness of the apparatus permits the assembly of contactors, reverser, line breaker, relays, etc., in one box as a single unit, making the installation easy and reducing the possibility of improper connections. The arc chutes are grouped as a single unit which can be swung down, exposing all contactors. The design and grouping results in a considerable saving in weight of control apparatus.

Fiber Conduit Insulation for Feeder Taps in Dubuque

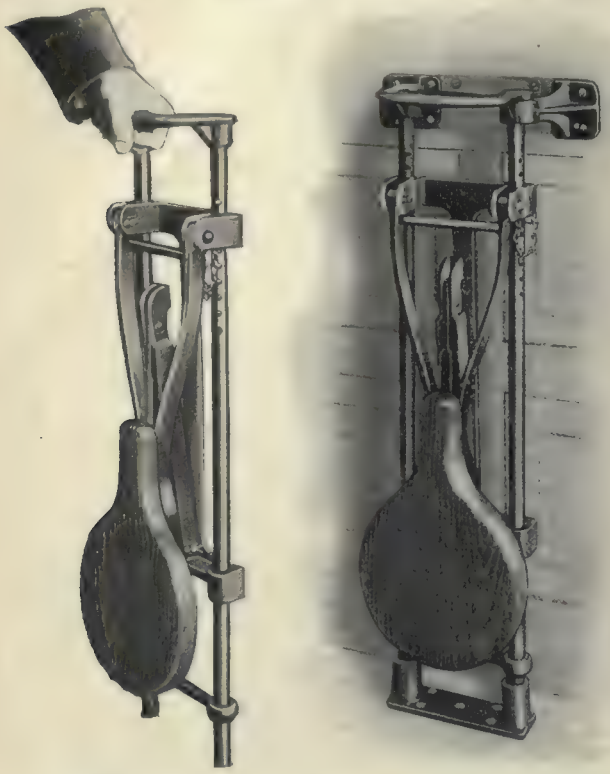
Fiber conduit instead of metal conduit is used by the Union Electric Company, Dubuque, Ia., to insulate its feeder-tap connections. The 550-volt d.c. trolley feeder is supported on a five-pin arm attached to the top of the wooden pole. On the same cross-arm with this feeder and on another below it are 2300-volt and 110-volt a.c. lighting and power wires. In order to make a connection to the trolley wire by way of a span wire which is attached to the pole below the cross-arms, the feeder tap must pass down along the side of the pole for a distance of 5 ft. or 6 ft. To protect the linemen when working on the pole, a section of 1½-in. fiber conduit is slipped over the feeder tap and fastened to the pole with metal straps. In addition to furnishing full insulation, the conduit is light, inexpensive and neat-looking.

DUBUQUE RAILWAY—FIBER CONDUIT USED TO INSULATE A FEEDER TAP

A feeder tap installed in the manner described is shown in the accompanying illustration.

Removable, Collapsible Motorman's Seat

A new removable type of Keystone motorman's seat is being manufactured by the Electric Service Supplies Company. This allows the seat proper to be transferred from one end of the car to the other with a minimum amount of difficulty. All of the quick collapsible and adjustable features of the standard Keystone seat are retained as will be noted in the accompanying illustrations. One pair of brackets for supporting the upper ends of the standards and one floor plate for securing their lower ends are the only stationary parts and these are so arranged that the seat can be readily disengaged by raising the standards a few inches. Special upper brackets are furnished to take care of the curvature of the inside of the dash or to overcome other existing obstructions.



REMOVABLE, COLLAPSIBLE MOTORMAN'S SEAT

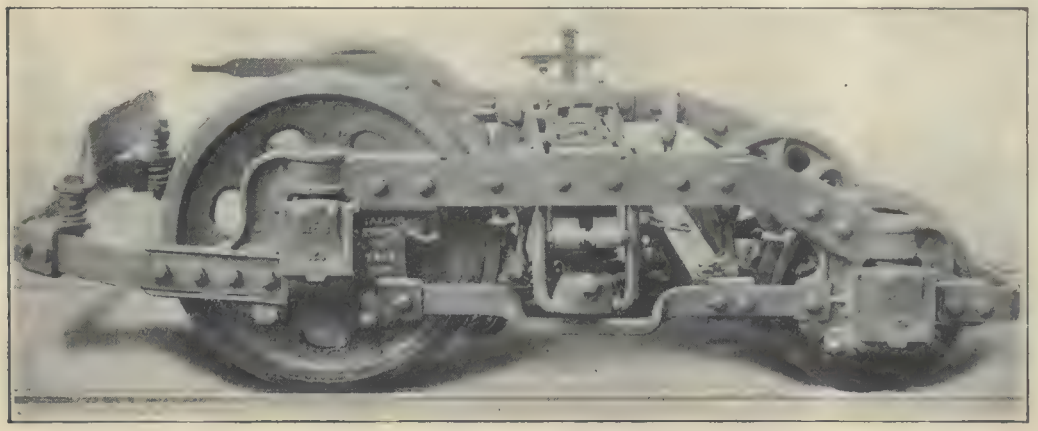
A Truck Designed for Low Maintenance Costs

The maximum traction truck of to-day with its improved arrangement of bolster with swing motion and center-bearing principle has come to be widely used for city service, and to meet the demand for this design the Taylor Electric Truck Company, Troy, N. Y., produced the Taylor maximum-traction double truck arranged for single motors, and providing from 65 per cent to 70 per cent tractive power on the driving wheels.

The details of this design received most careful consideration to include the latest and most up-to-date principles demanded in truck construction, and yet the important factor of simplicity has been retained throughout, especially in the brake mechanism as there are no offsets in brake levers or connection rods. The brake throughout is provided with case-hardened steel bushings and pins, and adjustment is easily and quickly made.

The easy riding qualities of the truck are not only due to the use of full elliptic springs, but to the one-piece, improved, bolster bale-hanger, the arrangement of which absolutely overcomes any side oscillation of the car body. The springs, both coil and elliptic, are manufactured at the Taylor plant, and are accurately proportioned and tested to insure the most satisfactory results in riding as well as in their qualities of endurance.

Reference to the accompanying cut shows that the pedestals are provided with improved wearing shims, and the deep-arched wrought-metal bolster and transom bars are arranged as well with easily-renewable take-up shims. The same simple means of adjustment of the truck side bearing with renewable wearing shoe is provided. As the truck is light in weight, yet carefully proportioned to sustain the maximum of overloading and frequent emergency braking strains that are common to city operation, it operates most satisfactorily with lowest maintenance costs.



MAXIMUM TRACTION TRUCK DESIGNED FOR LOW MAINTENANCE COST

Carbon-Vanadium Forging Steel

To meet the modern demand for steel of high elastic limit, the railroads have recently turned to heat-treated carbon and heat-treated alloy steels in many cases notwithstanding the lack of equipment for heat treatment in most of the railroad shops. This applies particularly to repair work, where for any reason the forging has to be locally heated, destroying thereby the effect of the heat treatment. In consequence, the American Vanadium Company has developed a type of simple carbon-vanadium steel which, without heat treatment other than annealing, equals all the requirements specified for heat-treated, plain carbon-steel forgings of like section. Furthermore, these results are obtained from steel with lower carbon than is generally used to obtain the physical requirements for heat-treated carbon-steel axles and forgings.

TESTS OF PLAIN CARBON-VANADIUM STEEL

Analysis, in per cent		Carbon	Manganese	Phosphorus	Sulphur	Vanadium
		0.47	0 90	0 012	0.020	0.15
Physical Properties:						
Description	Treatment	Yield Point, lb. per sq. in.	Elastic Limit, lb. per sq. in.	Ultimate Strength, lb. per sq. in.	Elongation in 2 in., Per Cent	Reduction of Area, Per Cent
7-in. axle	Natural	71,200	68,000	123,000	16 0	30.0
7-in. axle	Annealed 1450 deg. Fahr.	56,000	52,000	90,000	24 0	50 0
7-in. axle	O. Q. 1600; T. 1160 deg. Fahr	85,000	82,000	112,500	22.0	55.0
11-in. axle	Natural	75,000	70,000	117,000	16.0	28 5
11-in. axle	Annealed 1450 deg. Fahr.	58,000	54,000	94,000	22.0	47.0
11-in. axle	O. Q. 1600; T. 1160 deg. Fahr	87,000	80,000	115,000	20 5	52.0

Through the elimination of alloys other than vanadium, the cost of this steel is only a little higher than plain carbon steel, although the strength is materially higher. This is indicated in the accompanying table, which gives results of actual tests on the new type of metal. The effect of the vanadium in this case has been to increase very greatly the elastic limit and strength of the steel without lowering the ductility.

In general it may be said that vanadium has a very strong influence chemically and physically through its combination with carbon, in retarding segregation. Vanadium steels are all remarkably responsive to heat treatment, and this simple carbon-vanadium steel is no exception. Where still higher strength is desired than can be obtained by simple annealing, results can be obtained from this simple carbon-vanadium steel that will approximate those obtained from the more expensive alloy steels.

The heat treatment recommended is to heat the forgings uniformly to about 1600 deg. Fahr. and quench in oil. In case water is preferred as a quenching medium the temperature should be about 1550 deg. Fahr. The forgings should then be drawn back or tempered by heating to a temperature between 1100 deg. and 1150 deg. Fahr.

An Original Application of Signals for City Service

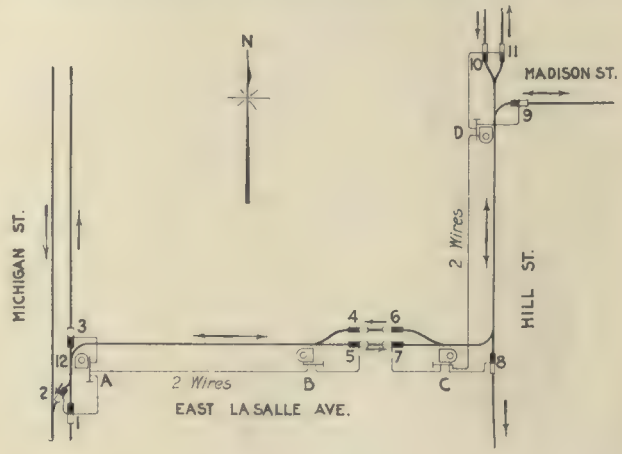
The Chicago, South Bend & Northern Indiana Railway Company has made some installations of Nachod Automatic Signals, Type CD, on its city lines in South Bend which are worthy of note as showing how the company has applied the signals to peculiar situations. There are eight signals in service, and the accompanying cut shows the layout of two blocks. Signals are located at the bases indicated for the signal poles, and the trolley contactors are installed in the overhead construction as indicated by the centers of their respective symbols.

The first single-track block extends between Michigan Street and the through-type turn-out on East La Salle Avenue. The second block extends from the other end of this turn-out to the turn-out on Hill Street just north of Madison Street. Each of them includes a turn at right angles so that the ends of the same block are not mutually visible. It may be noted by the position of the contactors that part of the first block is also traversed by the North Michigan Street cars, and part of the second by the Notre Dame Line on Hill Street. The Madison Street Line also enters the second block at Madison Street, leaving the first block on Michigan Street. Contactors 1, 2 and 3 are wired to signal A, contactors 4 and 5 to signal B, contactors 6, 7 and 8 to signal C, and contactors 9, 10 and 11 to signal D.

A car of the Madison Line passing under contactor 1, northward, sets signal B at "stop," (red light and red disk), and signal A at "permissive," (white light and white disk), and clears both these signals at contactor 5. At contactor 7 it sets signal D red and signal C white, and clears both these at contactor 9. The return trip is made under the same contactors in the opposite order, except that the car passes under contactor 2 on the cross-over on Michigan Street, instead of contactor 1. The Notre Dame cars run on Hill Street only, entering the second block at contactor 10 and leaving at contactor 8.

The contactors at signal A are so planned as to permit the northbound Michigan Street cars to operate without being interfered with by the signals. These cars do not observe signal A at all. If that signal should be neutral because no car is in its block, passage under contactor 1 would set signal A white and signal B red, but the same car continuing under contactor 3 will immediately restore both signals to their original condition. If this should be white, a following movement will be recorded by a second notch on the revolving switch, which will be stepped back again one notch by the car at contactor 3.

The control of the signals is such that even if signal A should be indicating red for the diverging route, a North Michigan car will merely count at contactor 1 without changing the signal indication, and will cancel that count at contactor 3. Contactor 3, therefore, may be regarded as a contactor to cancel the effect of running under contactor 1, which is, perforce, located on Michigan Street. It might be suggested that contactor 1 should be moved up past the switch on La Salle Street, but if such were the case a westbound car at contactor



ORIGINAL APPLICATION OF SIGNALS ON CHICAGO, SOUTH BEND & NORTHERN INDIANA RAILWAY

4 might set signal A red when the first car had just left Michigan Street and would be compelled to back up on a busy double track, a very inconvenient proceeding.

A selective method of protecting the same situation would be in combination with a Cheatham automatic switch to throw the switch-point marked 12. In this case contactor 1 would represent a Cheatham contactor. The Michigan Street car passing under contactor 1 with power off would throw switch-point for Michigan Street and the signal would not be operated. A Madison Street car, however, passing contactor 1 with power on would throw the switch-point and set signals for the diverging route on La Salle Street.

All of the signals in this installation are supported from cast-iron brackets on iron poles, and insulated from them by neat wood blocks with sunken bolt heads, the wires being run inside the pole. The wiring for wood poles is run in conduit which extends from the top of the pole to the fuse and control box located near the ground with an outlet branch at the signal. Locked fuse boxes give a manual control of the signals and also afford a convenient means of testing and disconnecting them. The trolley contactors are of the wiping type and the relay mechanism oil immersed.

Non-Splashing Track Switch

By a typographical error in the description of the non-splashing track switch on page 1084 of last week's issue, the location of the contactor employed was referred to as being on the "car" instead of on the "ear" in the overhead system. The accompanying illustrations showed the proper position of the contactor which is very simply mounted on standard ears without taking up any slack in the trolley wire.

News of Electric Railways

CHICAGO WAGE NEGOTIATIONS

Working Conditions Adjusted Satisfactorily. Question of Wages Still Being Considered

Negotiations leading to a new working agreement between the Chicago (Ill.) Surface Lines and its employees have reached the point where practically all questions regarding working conditions have been amicably settled. L. A. Busby, president of the company, in response to the demand for an increase in wages offered to readjust the existing graduated scale so as to reduce the difference between the maximum and minimum. Under the present contract the minimum wage is 23 cents and the maximum, after six years' service, is 32 cents. The new offer of Mr. Busby provides a 25-cent minimum with the existing maximum for the first year, a 25½-cent minimum for the second year and a 26-cent minimum for the third year, but no increase in the maximum. The company's records show that approximately 60 per cent of the trainmen receive the maximum wage. The employees requested a 33-cent minimum and 36-cent maximum, the maximum to be received after the first year of service.

Final answer by the representatives of the employees was delayed, however, awaiting the decision of Britton I. Budd, president of the elevated railroads of Chicago. These negotiations, like those for the surface lines, have resulted in disposing of the working conditions without difficulty, but the wage question is yet to be considered.

Mr. Busby wrote a letter to the employees in explanation of the company's position. Regarding the new working conditions he said that in 1912 the percentage of week-day straight runs was fixed at 27½ per cent and the new agreement provides for 40 per cent. In the old agreement the percentage of runs under fourteen hours was 62 per cent and the new agreement provides that 80 per cent of all week-day runs shall be completed within fourteen hours. In the 1912 agreement 14 per cent of all runs were more than sixteen hours, while all runs have now been brought within the sixteen-hour period. In the old contract the average time allowed for fallbacks was twenty minutes. The new agreement increases this allowance to twenty-five minutes. In addition the men have an allowance of thirty minutes for reliefs on the streets for meals.

Regarding wages the letter states that the management has acted not as individuals but as trustees. The last agreement was reached through arbitration. As a result the highest wage scale paid in any large city in the United States east of the Rocky Mountains was put into effect. To substantiate this a table showing the maximum wages paid in all the important cities was presented. Mr. Busby said that he did not believe it would be seriously contended that it cost more to live in Chicago than it does in New York, Boston or Philadelphia. On the other hand, the companies under the unification ordinance carried additional burdens in the shape of a universal 5-cent fare as against a 10-cent fare in some districts, and a universal transfer in lieu of cash fares formerly received in certain districts. This meant a loss in 1914 of not less than $3,000 a day. Superimposed upon this, the increase in the gross earnings, which was approximately 6 per cent, succeeded in reducing the deficit to about $500,000 in 1914. For the first four months of the current year the gross receipts showed a falling off of approximately $200,000 as compared with the same period last year. In 1913 the average receipts per car hour were $2.56, while the average receipts of 1914 per car hour were $2.50. Mr. Busby closed his letter as follows:

"In submitting this proposition we wish you to understand that our offer in our judgment is in nowise warranted by the existing financial and traffic conditions in this city, or by reason of any expected improvement in these conditions in the near future. We have, however, endeavored to meet a very difficult situation in the spirit of the utmost fairness and in the hope that some time during the life of the agreement such improvement in existing conditions may come about as to afford some excuse or warrant for the offer we are now making. . . . If, however, the proposition is not satisfactory we hereby offer to submit every question upon which we are not agreed to a board of arbitration."

On June 10 the surface and elevated railway employees refused the offer of the companies for increased wage and improved working conditions and also refused to submit to arbitration, stating that the experience of three years ago had proved that they would fail to secure their demands. Both Mr. Budd and Mr. Busby offer to arbitrate the differences. Mayor Thompson also urged arbitration. The ultimatum of the employees called for a strike at the close of all runs on June 11, but early on that day the strike order was temporarily revoked largely through the efforts of the Mayor. Adverse public opinion and failure to obtain the support of the press also influenced the last-hour truce. W. D. Mahon of the Amalgamated Association arrived in Chicago on June 11 to confer with the Mayor on the terms of arbitration.

HOPEFUL OUTLOOK IN DES MOINES

Mayor Hanna and other city officials are hopeful of an early settlement of the street railway franchise question in Des Moines. The ruling of the State Supreme Court gives until June 22, 1915, for the securing of a franchise by the Des Moines City Railway. A committee of the Des Moines Chamber of Commerce has been working with the City Council and representatives of the company for a settlement and an agreement practically has been reached. The capitalization of the company probably will be fixed at $5,000,000 as contended for by the company, but there may be concessions as to fares. Under the proposed plan of settlement there will be a board of directors composed of business men of the city, with Emil G. Schmidt, president of the company, as chairman. Provision is made for the purchase of the company's property by the city if desired. The proposed ordinance will be submitted to a vote of the people as soon as the terms have been agreed upon by the company and the Council. If the franchise is granted at an early date an end will be put to court proceedings now in progress to protect the rights of bondholders of the company under the present situation, in which the company is operating without legal status, according to the ruling of the State Supreme Court. Three members of the City Council, enough to control, favor a speedy settlement of the controversy, and it is coming to be generally recognized that the industrial and commercial prosperity of the city is threatened because the company is held back from making necessary improvements and repairs on account of financial difficulties into which it has been plunged through its inability to negotiate a franchise with the governing body of the city.

CLEVELAND CHARGES DISMISSED

The Cleveland (Ohio) Railway and Peter Witt, street railway commissioner, were acquitted of the charges of favoritism in awarding contracts for construction work in the report of the special committee of the Council filed with that body on June 1. The committee made a thorough investigation of the charge of Roderick D. Grant that he had been offered $12,000 to withdraw his bid on the Harvard Avenue carhouse a year go. Representatives of the company accused claimed that the offer was for the purchase of the contract and that nothing was said in regard to withdrawing it. The report reads in part as follows:

"The weight of evidence seemed to be that the $12,000 was not a bribe, but was an offer to purchase the contract of a competitor. The contract was awarded to the lowest bidder at a fair price. The charge that the street railway commissioner allowed excessive expenditures by the company is entirely without foundation. The office of the street railway commissioner is equipped to check the expenditures of the company and does fully check them."

The report was adopted by a vote of twenty to six.

The Ohio Supreme Court granted a temporary injunction on June 3, restraining the Cleveland Railway from building tracks on Euclid Avenue between East Twenty-second and East Fortieth Streets. The company was placed under a bond of $500 for the faithful observance of the order until

June 30, when the Court will hear the case on its merits. Frank Billings and fifty-six other residents of this section of the street, known as Millionaires' Row, brought the suit and lost in both the Common Pleas and Appellate Courts.

LOS ANGELES TRANSIT PROBLEMS

Definite plans for solution of the transportation problems in Los Angeles, Cal., are outlined in a report which has been drafted by F. D. Howell, chief engineer for the transportation division of the Public Utilities Board of that city. The report will come before the Utilities Board at an early meeting, and then go to the City Council to be adopted formally and officially as the policy of the city. In general, the report presents three special features that are demanding attention. The first is the rerouting of cars to relieve congestion in the business districts. The second is further improvement of the city's subways, and the third is the entire elimination of grade crossings. All these three subjects, the report says, are interdependent. On the subject of interurban traffic, the report suggests that the electric interurban lines should be required either to elevate or depress their tracks from the city limits, the method being according to the topography and condition of the territory traversed. These tracks should lead to an elevated terminal or a subway loop without terminal. The street railway problem, the report says, is made serious because of the obstructions caused by surface interurban cars and grade crossings that must be flagged. In the business district the plan is to try rerouting, and if this does not relieve congestion the report favors subways in the shopping district.

THE KANSAS FLOODS

The Metropolitan Street Railway, Kansas City, Mo., and most of the interurbans operating into that city, were discommoded by the recent heavy rainfall. There was almost a cloudburst on May 26. Turkey Creek overflowed and the Southwest boulevard district was flooded. The water lacked fully 10 ft. of reaching last September's altitude, but it came within 50 ft. of the Metropolitan Street Railway's carhouse. The company moved its cars, and later moved its office equipment, desks and chairs in a mail car to a dead track on Eleventh Street, between Wyandotte and Broadway. From these temporary headquarters the division was conducted for three days. No damage was done to the carhouse or the equipment of the company. Cars were run on both sides of the flooded part of the street and passengers were transferred by wagon.

The flooding of the rivers caused little or no damage to the interurbans, other than washing mud and debris on the tracks. The Leavenworth line lost two trips through this cause. The Bonner Springs line lost a full half day on May 26, and service was irregular until Monday morning. The most serious damage in connection with this line was to the new work on the extension toward Lawrence. The completion of the extensions will not be seriously delayed, however, as no tracks had yet been laid.

Along the Kansas City, Clay County & St. Joseph Railroad there was one stretch of about a mile through a deep cut that had several bad washes, with mud from 2 ft. to 3 ft. deep on the tracks. A new ditch digger just equipped for service by the company plunged into the mess, and by Monday morning the track was comparatively clear.

On the Excelsior Springs division of this line, about 1200 ft., the tracks run between banks 20 ft. high. Mud covered the tracks nearly throughout the cut to a depth of 4 ft., being constantly replenished as shoveled away, from the high banks. Finally J. R. Harrigan, general manager, ordered two nose plows to be hooked onto the front ends of express cars and made to shove mud. They cleared the track.

The Kansas City, Lawrence & Topeka Railroad was held up in Rosedale, where the Southwest boulevard was flooded. The Missouri & Kansas Interurban Railway had little trouble.

Chicago Home Rule Defeated.—The measure to give Chicago home rule and grant to all cities in the State with a population of more than 2000 the option of regulating their own utilities was defeated in the Illinois Legislature.

Omaha Valuation Requested.—The State Railway Commission of Nebraska has received a request from Omaha for a physical valuation of the Omaha & Council Bluffs Street Railway for use in the Federal court in the suit to require the company to establish fares at the rate of seven for a quarter.

Pennsylvania Starting Postponed. — Owing to the fact that it was impossible to complete the electrification of the Pennsylvania Railroad's line between Philadelphia and Paoli in time, the inauguration of service by electricity, scheduled to take place on June 1, was postponed by the officials of the road for a few weeks.

Demands of Providence Employees.—The employees of the Rhode Island Company, Providence, R. I., who are organized as a division of the Amalgamated Association, have requested that the agreement with the company, which is about to expire, be modified so as to provide for an increase of approximately 20 per cent in wages, a closed shop and a minimum guaranteed day of seven hours.

Washington Valuations.—The State Tax Commission, of Washington as a basis for the levying of taxes this fall, to be collected next year, recently fixed the valuations of the street railway and interurban holdings in the State, as well as the steam lines, at $395,107,312, an increase of $3,738,705 over the valuations last year. The electric lines have a total actual valuation of $49,066,455 against $49,211,280 a year ago.

Demand Municipal Line Be Run for Profit.—An editorial on the municipal railway in San Francisco which appeared in the San Francisco *Chronicle* of May 30 was concluded as follows: "At any rate, now that we have a municipal system, it should be run on business principles, for a profit. The talk about running public services for the 'general welfare' is rot. It means compelling one set of people to pay part of the transportation expenses of another set of people."

Compromise of St. Louis Suit Suggested.—A resolution introduced by Alderman Wyrick authorizing the public utilities committee of the Council of St. Louis, Mo., to confer with officials of the United Railways in an effort to compromise the mill tax cases has been adopted by the Board of Aldermen by a vote of twenty-four to three. The mill tax cases have been pending in the courts about nine years, and the accumulated mill tax due to the city now amounts to about $2,500,000.

Dallas Investigation.—The annual city budget of Dallas, Tex., contains an appropriation of $10,000 to cover an investigation of public service corporations as pledged by the platform of the present administration. Commenting upon the order, Charles F. Wallace, directing head of the local Stone & Webster interests, said: "The plan which has been adopted by the commission is the only sound one. We welcome the investigation, feeling that it will have the effect of establishing closer and better relations between the community and ourselves."

The New Cleveland Subway Line.—O. C. Barber, head of the Cleveland, Akron & Canton Terminal Railway, addressed the City Council at Cleveland, Ohio, on June 1, and endeavored to have the members take a more liberal view of the plans that have been made for an electric freight subway under East Fifty-fifth Street than they have heretofore displayed. Councilman Bernstein endeavored to secure an estimate of the cost of the subway. Attorney W. W. White for the company replied that it would be impossible at this time to give him exact figures, but that the cost would be about $15,000,000.

Appointments to the West Virginia Commission.—Elliott Northcott, Huntington; William M. O. Dawson, Charleston, and Judge E. F. Morgan, Fairmont, were appointed members of the Public Service Commission of West Virginia by Governor Hatfield on June 6. Mr. Dawson is a former Governor of the State and has held many state offices during his career. Mr. Northcott is a close personal and political friend of Mr. Dawson and held the post of minister to Venezuela under President Taft. Judge Morgan is well known in his section of the State, but has not been engaged in state-wide politics to the extent the other two members have.

Detroit Purchase Negotiations. — James Couzens, chairman of the Detroit board of street railway commissioners, announced in the newspapers that negotiations with the De-

troit (Mich.) United Railway for the purchase by the city of the company's property within the one-fare zone had reached the point where it was likely that submission of the proposition to the electors could take place in August or September. Mr. Couzens stated that there were a few matters to be ironed out by the attorneys, but that he expected the contract between the city and the company would be completed in time for submission to the stockholders of the company on June 16. The present plan of municipalization provides for the fixing of the purchase price by the circuit court of Wayne County.

Suggestions Regarding Municipal Ownership in Toronto.—Mayor Church of Toronto, Ont., on May 31 made public a letter of Corporation Counsel Geary in reference to the taking over by the city of the Mimico and the Scarboro radial lines of the Toronto & York Radial Railway within the city limits. It confirms the report that the company would apply for running rights over the lines purchased by the city. Mr. Geary said in part: "This application should be disposed of at once. There should be no discontinuance of the traffic on purchase by the city. I would suggest, therefore, that the city determine its policy with regard to the two sections of radial line as to through traffic and as to local traffic. As to the remuneration to be paid by the company for running rights, the commissioner of works should be asked to consider this question."

Pennsylvania Compensation and Other Measures Signed.—On June 7 Governor Brumbaugh of Pennsylvania signed the six bills, effective on Jan. 1, 1916, which provide a complete system of compensation and State insurance. Shortly before signing these bills the Governor approved the Senate bills bringing the 600,000 coal miners of the State under the compensation system. This disposes of all compensation legislation save the resolution for a constitutional amendment making acceptance of the compensation laws mandatory instead of elective on the part of employers. This resolution, which must pass the next Legislature before it can go to the people, is in the hands of the Secretary of the Commonwealth. On the same day the Governor also signed the bills changing the periods of reporting by corporations, and other bodies subject to State tax, except banks, savings institutions, title insurance, trust companies, building and loan associations and foreign insurance companies. Under the new laws these reports are to be made for the calendar year instead of a year ending early in November. Provision is also made for enforcement of reporting. The Governor also signed the act enabling the Public Service Commission to name examiners to take testimony anywhere in the State and thus save complainants the expense of coming to the State capital. It also allows appeals direct to the Superior Court, instead of first passing through the Dauphin County Court.

PROGRAMS OF ASSOCIATION MEETINGS

Illinois Electric Railway Association

The summer meeting of the Illinois Electric Railway Association will be held on June 25. Arrangements have been made for a trip from Chicago to Milwaukee on the *S. S. Christopher Columbus* of the Goodrich Lines, returning by way of the Chicago & Milwaukee Electric Railroad and the Northwestern Elevated Railroad. The steamer is scheduled to leave Chicago at 9:30 a. m. and arrive at Milwaukee at 2:30 p. m. Dinner will be served on the boat. The expense of the trip is $1.75 for each person. This is to be a get-together meeting. Members are urged to bring their friends with them. The only formal business will be the presentation of the reports of the engineering committee on the questions submitted to the members at the March meeting.

New York Electric Railway Association

As previously announced in the ELECTRIC RAILWAY JOURNAL the thirty-third annual meeting of the New York Electric Railway Association will be held at the Oriental Hotel, Manhattan Beach, N. Y., on Tuesday and Wednesday, June 29 and 30. The annual banquet is scheduled for eight o'clock on Tuesday evening, June 29, at which time several distinguished speakers will deliver addresses.

There will be business sessions, morning and afternoon, Tuesday, June 29, and a morning session on Wednesday, June 30. The subjects of the papers to be presented for general discussion are as follows:

"The Proper Type of Car for City and Suburban Service."

"What Can We Give for a Nickel?"

"The Protection of Interurban Railway Highway Crossings."

"Jitney-Bus Competition."

In addition to the above-named subjects the following general questions will also be introduced for discussion:

1. What success have you had in arc-welding manganese and other special work repairs?
2. To what extent do you use hardened steel pins and bushings in brake rigging?
3. How often do you change your "Safety First" posters and other announcements to keep alive the interest of public and employees?
4. What is your experience as to the relative merits and fields of different classes of railway special work? Do you base your opinion on the number of wheels which pass over the work, the angularity of the crossing, the character of the foundation, etc.?
5. Is there any way of testing the contactor coils on type M control without tearing them down?
6. What is your experience with fittings for concrete poles?
7. What, in your experience, is the limiting car speed for which overhead contact signal systems are reliable?

Applications for hotel accommodations should be made to Joseph P. Greaves, manager, Oriental Hotel.

Pacific Claim Agents' Association

The seventh annual convention of the Pacific Claim Agents' Association will be held at San Francisco, Cal., on June 24, 25 and 26. Discussion of the following subjects will be presented in the form of papers, the name given in connection with each being that of the person to whom President A. M. Lee has assigned the same:

Collisions—

"The Prevention of Automobile Accidents," by S. A. Bishop, general claim agent of the Pacific Electric Railway.

"Investigating and Handling of Automobile Accidents," by J. S. Mills, assistant superintendent of the Key Route, Oakland, Cal., and H. H. Benton, district claim agent of the Northern Pacific, Seattle.

"Investigating and Handling of Collisions with Pedestrians and with Vehicles Other Than Automobiles," by Thomas G. Aston, claim agent of the Washington Water Power Company, Spokane, Wash., and W. H. Moore, claim agent of the San Diego (Cal.) Electric Railway.

Medical Department—How Organized and Managed to Be Most Effective:

To the Employees, by H. K. Relf, general claim agent of the Spokane, Portland & Seattle Railway, Portland, Ore.

To the Claim Department, by George Carson, general claim agent of the Puget Sound Traction, Light & Power Company, Seattle, Wash., and J. H. Handlon, claim agent of the United Railroads, San Francisco, Cal.

In Litigated Cases, by A. J. Falknor, trial attorney of the Puget Sound Traction, Light & Power Company, Seattle, Wash., and F. J. Lonergan, trial attorney of the Portland Railway, Light & Power Company.

Employment Bureau—

"How to Make It Most Effective," by H. G. Winsor, claim agent of the Tacoma Railway & Power Company.

"To What Extent and How Should the Claim Department Be Consulted?" by Mrs. Ida P. Newell, assistant claim agent of the Portland Railway, Light & Power Company.

"The Investigator and His Work," by C. F. Young, adjuster of the Puget Sound Traction, Light & Power Company.

"The Adjuster and His Work," by W. F. Every, general claim agent of the Northern Pacific Railway, St. Paul, and Thomas A. Cole, of the Los Angeles (Cal.) Railway.

Safety Committee Program—

"Mandatory Rules and Their Results in Accident Prevention," by F. M. Metcalfe, superintendent of efficiency of the Northern Pacific Railway, St. Paul, Minn.

"Organization of Public Safety Committees and Their Co-operation with Transportation Companies," by B. F. Boynton, claim agent of the Portland Railway, Light & Power Company.

Details of the entertainments remain to be arranged.

Financial and Corporate

ANNUAL REPORT

International Traction Company

The comparative statement of income, profit and loss of the International Traction Company System, Buffalo, N. Y., for the years ended Dec. 31, 1913 and 1914, may be shown as follows:

	1914	1913
Earnings:		
Gross passenger earnings	$6,492,212	$6,404,101
Receipts from other sources	268,368	290,341
Total	$6,760,580	$6,694,442
Expenses:		
Operating expenses	$3,601,800	$3,698,059
Taxes	423,632	392,613
Total	$4,025,432	$4,090,672
Net earnings from operation	$2,735,148	$2,603,770
Fixed charges:		
Interest	$1,645,401	$1,572,737
Rentals	45,379	32,185
Sinking fund and amortization of debt discount and expense	132,601	129,803
Total	$1,823,381	$1,734,725
Balance for renewals, replacements and dividends	$ 911,767	$ 869,045
Renewals and replacements reserve	359,244	204,000
Surplus	$ 552,523	$ 665,045

The gross earnings of the system for 1914 were $6,760,580, an increase of $66,137 over the previous year, or approximately 1 per cent. The small increase in gross earnings was due to the business depression during the year. The actual operating expenses and taxes for 1914 were $4,025,432, or $65,240 less than the previous year. The actual maintenance expenses were $103,347 less than the previous year, while the balance of the operating expenses increased $7,088, making a net saving in operating expenses of $96,259.

The taxes for 1914 exceeded 1913 by $31,019, which was due to an increase in tax rates of the various municipalities, the assessments being maintained about the same as for 1913. The fixed charges for 1914 were $1,823,380, or an increase of $88,656 over the previous year. This was caused by the interest accrued on additional bonds and mortgages issued for improvements and acquisition of additional property and also by an increase of rental and amortization charges.

The balance remaining for renewals, replacements and dividends was $42,722 more than in 1913. The renewals and replacements reserve shows an increase of $155,244, which was due to the above-mentioned reduction in the actual maintenance expenditures, plus an additional allowance in respect to maintenance and depreciation amounting to $51,897.

MR. HEULINGS ON TRADE CONDITIONS

W. H. Heulings, Jr., vice-president J. G. Brill Company, Philadelphia, testified before the Federal Trade Commission in New York on June 3, in regard to the desirability of legalizing combinations among American business men on foreign trade matters. Mr. Heulings said that the Brill company competes with all American builders and with those of France, England and Germany. The foreign business of the company has been increasing regularly and now comprises about one-third of its total. As a rule, when domestic business is poor, foreign business is better. The company feels the need of an adequate merchant marine so that it may have good shipping facilities to foreign ports for its products.

Mr. Heulings said he had a very keen desire to see something done that will promote a merchant marine and thinks that a subsidy or some other similar means should be adopted. He does not feel that his company needs cooperation in order to secure foreign business, but it would be a decided advantage. Being directly at the seaboard, it is situated more conveniently for shipping facilities than other concerns located in inland states. The company has a few agencies in foreign countries, but most of its business is done directly by its personal representatives. Mr. Heulings said that in most cases when the company sells cars to foreign buyers, it receives payment in New York. It is not difficult for a foreign corporation of good standing to get credit in New York. The company has not had to extend credit in order to get business. Where it had long standing business relations with buyers, as in the case of the companies directed by the late F. S. Pearson, it had given credit.

In answer to an inquiry from one of the commissioners, Mr. Heulings said that if export combinations should be made legal there would be no difficulty about keeping foreign business separate from domestic trade. It had been his experience that in new foreign enterprises where German capital was used German apparatus was almost always bought. It is not so likely to be the case, if British or French capital is employed, that British or French apparatus is used.

Mr. Heulings thought that many companies in various and diversified lines of business in this country would profit greatly by combinations which would enable them to meet foreign competition on equal ground. The establishment of branch banks in South America is a decided forward step in the interest of manufacturers of this country.

SAN FRANCISCO-OAKLAND STATUS

Board of Directors Issues Statement Showing Why Fundamental Readjustment Is Desirable

The board of directors of the San Francisco-Oakland Terminal Railways, Oakland, Cal., has issued to security holders a general statement of financial conditions, setting forth various reasons why a fundamental readjustment of the present organization is essential. The outstanding obligations on which interest must be paid, sinking funds maintained and payment of principal provided for amount to $20,724,000, upon which the annual interest totals $1,133,646. The sinking fund requirements are becoming especially burdensome. In 1910 they amounted to only $30,150, but by 1917 they will reach $723,125. Other demands have been such that the company has been unable to meet the instalments of its various bond sinking funds maturing since Jan. 1, 1914. These payments are, therefore, now in default, and there is no prospect that this default can be made up out of earnings or that the heavy requirements of future years can be provided therefrom.

The road has suffered a decrease of approximately $125,000 in earnings from the middle of last December to the present time on account of jitney-bus competition. The present management has effected economies in practically all departments of operating expense, except labor and taxes. By reason, however, of the loss from jitney-bus competition and the general business depression during the last half of 1914, gross and net earnings for the current fiscal year show a considerable decline as compared with the three preceding years. The net income will not be sufficient to pay interest charges and sinking fund requirements, disregarding entirely requirements for necessary capital expenditures.

In spite of the fact that the assets of the company exceed its outstanding debt by a considerable margin, it is stated that the values existing in the company's securities can be protected only by the correction of all of the following conditions:

(1) It is impossible for the company to make the sinking fund payments required by the several deeds of trust. These deeds of trust provide no method for modifying the requirements and relief can therefore be obtained only by the unanimous consent of the bondholders of all issues, or the issuance of new bonds to take the place of those now outstanding.

(2) It is absolutely essential for this corporation, as it is for every public utility, to be able to raise capital for necessary betterments and extensions. This is impossible under the present financial structure of the company. Its bond issues are so numerous and so involved and its existing defaults so serious that it is not able to sell new bonds, nor is it able otherwise to borrow money, except by way of accommodation and under the most urgent circumstances.

(3) The company is obligated to pay $3,600,000 of notes,

which are now approximately two years overdue. Irrespective of any indulgence which may be offered by the noteholders it is imperative, from the company's standpoint, that these obligations be paid in order to save the securities which are pledged to secure the same, and re-establish the credit of the company.

(4) The $1,121,000 of bonds of the Oakland Transit first mortgage issue will mature on July 7, 1918, and their payment must therefore shortly be provided for.

(5) The present financial condition of the company greatly hampers the economical operation of its property.

For the above it is concluded that "such a fundamental readjustment of the financial structure of the company as will put it on a permanently sound basis would appear to be to the interest of all security holders."

Barcelona Traction, Light & Power Company, Barcelona, Spain.—The Barcelona Traction, Light & Power Company is offering at 96 £900,000 of prior lien bonds, series A, of which one-half will be placed privately in the United Kingdom and the other half elsewhere. These bonds are part of an authorized issue of £2,000,000, to be used for completing the works and funding the interest on bonds as well as on various advances.

Camaguey (Cuba) Company, Ltd.—The stockholders of the Camaguey Company, Ltd., are to vote on June 22 in regard to an offer from the Electric Bond & Share Company to purchase the property for $500,000, subject to outstanding bonds. The Cuban company has $1,000,000 of capital stock and $570,173 of first mortgage 5 per cent bonds.

Charleston (W. Va.) Interurban Railroad.—Robert Garrett & Sons and the Fidelity Trust Company, Baltimore, are placing at 99½ and interest $450,000 of three-year 6 per cent collateral trust gold notes of the Charleston Interurban Railroad, dated May 1, 1915. The authorized issue is $750,000. The notes are being issued to retire the floating debt contracted in building the interurban line to St. Albans and to construct a 24-mile extension to Montgomery.

Chicago & Milwaukee Electric Railroad, Highwood, Ill.—The reorganization committee of the Chicago & Milwaukee Electric Railway is now said to be at work on plans to take the company out of the receivership which has existed since January, 1908. The plans are contingent on the raising of $5,000,000 in cash to clear up all obligations of the company. This sum would be used as follows: To clear up underlying first mortgage bonds, $1,080,000; to retire receivers' certificates, $1,200,000; for other liens, $500,000; for new construction and rehabilitation, $1,500,000, and for reorganization and miscellaneous, $720,000. It is reported that the committee is now negotiating with Chicago and New York bankers for the sale of first mortgage 5 per cent bonds of the new company to raise this cash.

Columbus, Delaware & Marion Railway, Cincinnati, Ohio.—Representatives of the consolidated bondholders of the Columbus, Delaware & Marion Railway have objected to the application of the receiver of the company to issue $150,000 of receivers' certificates to pay $55,000 of back obligations of the receiver, $13,500 of back salary and $40,000 of bond interest, due Aug. 1. It is declared that the road should be permitted to default the August interest and thus clear the way for a foreclosure and reorganization. Other bondholders have asked the court to authorize the payment of the interest. Previous reference to this situation was made in the ELECTRIC RAILWAY JOURNAL of May 1.

Fresno (Cal.) Interurban Railway.—The California Railroad Commission has authorized the Fresno Interurban Railway to issue 250 shares of capital stock and $70,000 of first mortgage bonds. The order provides that the company may sell the stock at not less than 80 and its bonds at not less than 90. The company proposes to construct extensions and purchase new equipment with the proceeds. The application for these issues was noted in the ELECTRIC RAILWAY JOURNAL of May 15.

Interborough Consolidated Corporation, New York, N. Y.—The directors of the Interborough Consolidated Corporation, the company formed by the consolidation of the Interborough-Metropolitan Company and the Finance & Holding Corporation, as noted in the ELECTRIC RAILWAY JOURNAL of June 5, are the same as those of the Interborough-Metropolitan Company with the exception of George W. Young, who has been succeeded by F. P. Frazier. The new directors have organized by electing the same officers as those of the Interborough-Metropolitan Company. August Belmont is chairman of the board of the new company, T. P. Shonts, president, H. M. Fisher, secretary, and J. H. Campbell, treasurer. It is expected that the directors will meet shortly to complete organization details, and it is considered likely that an initial dividend will then be declared upon the preferred stock. The new stock certificates are now being engraved. As soon as they are ready, the company will announce the details of exchange to the old certificate holders.

Lewiston, Augusta & Waterville Street Railway, Lewiston, Maine.—E. W. Clark & Company, Philadelphia, and Ludwell L. Howison, Portland, have sold at 97¼ and interest $614,000 of three-year 5 per cent second gold coupon notes, series C, of the Lewiston, Augusta & Waterville Street Railway. The authorized issue is $750,000, the remainder of the notes being reserved for future use. The present issue was used to refund $500,000 of 5 per cent two-year notes due on June 1 and for other purposes. The new notes are guaranteed by the Cumberland County Power & Light Company and are secured by a deposit of $853,000 of first and refunding mortgage 5 per cent bonds of the railway.

Manchester Traction, Light & Power Company, Manchester, N. Y.—The New Hampshire Public Service Commission has authorized the Manchester Traction, Light & Power Company to issue $1,000,000 of three-year 5 per cent notes at not less than 95. The proceeds of the notes will be used to retire floating indebtedness and to provide for new construction to plant. Tucker, Anthony & Company, Boston, have already sold the issue at 97½.

New York (N. Y.) Railways.—Frank L. Hall, Charles P. Howland and George B. Leighton have been asked by holders of New York Railways adjustment mortgage 5 per cent income bonds, owning and representing more than $6,000,000 thereof, to consider the advisability of continuing the litigation against the company for the unpaid interest on such bonds. In a circular to bondholders the committee says that it is of the opinion that the litigation should be vigorously pressed and a judicial decision obtained as to the manner of determining income applicable to bond interest which will insure future payment of the full 5 per cent. The amount of unpaid interest involved in the litigation to date is said to be upwards of $1,500,000. The committee states that its preliminary investigation of condition of the New York Railways should be reassuring to holders of adjustment bonds, for the company is in a strong financial condition with large cash reserves.

Northern Ohio Traction & Light Company, Akron, Ohio.—Hayden, Miller & Company, Cleveland, have purchased a new issue of $500,000 one to five-year 6 per cent collateral trust notes of the Northern Ohio Traction & Light Company, subject to the approval of the Ohio Public Utilities Commission. They will be offered shortly at par and interest according to plans generally understood now. The collateral underlying the issue includes that deposited under a former issue, which has been greatly reduced by maturity. This issue of notes will cover fairly well the floating debt of the company.

People's Railway, Wilmington, Del.—The price paid for the purchase of the People's Railway by the Wilmington & Philadelphia Traction Company, as announced in the ELECTRIC RAILWAY JOURNAL of June 5, has not been made public, but the consideration is said to have been a substantial block of the latter company's stock. T. W. Wilson, vice-president and general manager of the purchasing line, says: "As soon as the proper consents can be obtained from the public authorities for the necessary track connections between the two systems, important changes will be made in the routing and headway of the various lines, and transfers, under proper regulation, will be given between the lines of the People's Railway and the lines of the Wilmington City Railway to persons paying the full fare. The conductors and motormen of the People's Railway will also be materially benefited, for

the Wilmington & Philadelphia Traction Company schedule of carmen's wages will be in force on both systems. This will mean an increase of about 3 or 4 cents per hour for the People's Railway carmen." The general offices of the People's Railway will be transferred from Wilmington to the offices of the Wilmington & Philadelphia Traction Company at 603 Market Street, Philadelphia.

Philadelphia Company, Pittsburgh, Pa.—The Philadelphia Company has sold through a syndicate headed by Ladenburg, Thalman & Company $2,000,000 of one-year 5 per cent notes, due on May 15, 1916, the proceeds of which are to be used for general corporate purposes. S. D. Carson has been elected a director to succeed M. H. Furland, resigned.

Trenton, Lakewood & Seacoast Railroad, Trenton, N. J.—The Board of Public Utility Commissioners of New Jersey has authorized the Trenton, Lakewood & Seacoast Railroad to issue $190,000 of bonds to be sold at 80, upon condition that stock to the amount of $85,000 be subscribed and paid for at par. These amounts were deemed by the commission adequate to cover the acquisition of land not included in contracts for rights-of-way heretofore capitalized. The total application was for $200,000 of stock and $320,000 of bonds. Decision was reserved as to the balance.

United Light & Railways Company, Grand Rapids, Mich.—The United Light & Railways Company has sent out notices to its second preferred stockholders advising them that they are entitled to exchange their present holdings of second preferred 3 per cent cumulative stock for either first preferred 6 per cent cumulative stock or common stock of the company, par for par. This privilege takes effect on June 15, and extends for sixty days.

Dividends Declared

Boston & Worcester Electric Companies, Boston, Mass., $1, preferred.

Brazilian Traction, Light & Power Company, Toronto, Ont., quarterly, 1½ per cent, preferred.

Eastern Power & Light Corporation, New York, N. Y., quarterly, 1½ per cent, preferred.

Indianapolis (Ind.) Street Railway, 3 per cent.

Tri-City Railway & Light Company, Davenport, Ia., quarterly, 1½ per cent, preferred.

United Light & Railways Company, Grand Rapids, Mich., quarterly, 1½ per cent, first preferred; quarterly, three-fourths of 1 per cent, second preferred.

Virginia Railway & Power Company, Richmond, Va., 3 per cent, preferred.

West End Street Railway, Boston, Mass., quarterly, $2, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period			Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, MAINE							
1m.,	Apr.,	'15	$60,618	*$31,101	$29,517	$17,620	$11,987
1 "	"	'14	56,594	*25,931	30,663	17,541	13,122
12 "	"	'15	787,177	*378,258	408,919	209,792	199,127
12 "	"	'14	775,456	*352,822	422,634	208,192	214,442
CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.							
1m.,	Apr.,	'15	$87,745	*$58,533	$29,212	$29,291	†$79
1 "	"	'14	90,429	*57,600	32,829	27,597	5,232
12 "	"	'15	1,049,582	*705,016	344,566	346,193	†1,627
12 "	"	'14	1,200,748	*717,501	483,247	311,573	171,674
CLEVELAND, SOUTHWESTERN & COLUMBUS RAILWAY, CLEVELAND, OHIO							
1m.,	Apr.,	'15	$96,217	*$68,087	$28,130	$27,590	‡$780
1 "	"	'14	99,627	*65,412	34,215	27,339	6,875
4 "	"	'15	369,082	*258,101	110,981	109,821	‡1,400
4 "	"	'14	373,925	*258,639	115,286	108,989	6,297
COLUMBUS RAILWAY, POWER & LIGHT COMPANY, COLUMBUS, OHIO							
1m.,	Apr.,	'15	$247,363	*$151,840	$95,523	$39,211	$56,312
1 "	"	'14	248,748	*154,085	94,663	41,200	53,463
12 "	"	'15	3,074,166	*1,861,754	1,212,412	473,827	738,585
12 "	"	'14	3,040,893	*1,961,849	1,079,044	487,239	591,805
COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY, GRAND RAPIDS, MICH.							
1m.,	Apr.,	'15	$1,093,746	*$585,894	$507,852	$359,203	$148,649
1 "	"	'14	1,108,399	*588,555	519,844	343,170	176,674
12 "	"	'15	14,016,905	*7,521,252	6,495,653	4,277,796	2,217,857
12 "	"	'14	13,882,485	*7,712,405	6,170,080	3,966,730	2,203,350

*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

THE JITNEY BUS

Regulatory Ordinances Passed in Schenectady, Peoria, Des Moines and Portland, Ore. Action on Pennsylvania State Measures

Under the provisions of the amendment to the transportation corporation law the city of Schenectady has passed an ordinance to regulate the jitney. No person is to engage in the business of carrying passengers for hire in automobiles at a rate of fare of 15 cents or less for each passenger except as provided in the ordinance. Persons who desire to obtain licenses must deliver to the commissioner of public safety an application containing full information about their car or cars and file a map showing a route at least 3 miles in extent for the round trip, and a schedule which must be continuous for at least sixteen hours per day for at least six days a week. Together with such application there must be delivered to the commissioner a bond in the penal sum of as many times $1,000 as the number of passengers each car is designer to carry, exclusive of the driver. In no event is the sum to be less than $5,000. The commissioner of public safety is empowered to direct that the automobiles be presented at a place designated by him for inspection. If the commissioner is satisfied that the automobile is in safe condition, and that the route proposed is not supplied with adequate transportation facilities, and that the schedule and bond are satisfactory, the commissioner is authorized to issue a license authorizing the carrying of passengers for hire in the automobile designated in the application. In lieu of the bond the commissioner may accept a policy of insurance issued by a corporation satisfactory to the commissioner and binding such corporations in the same manner as prescribed for the direct bond from the owner. There must be paid to the commissioner of public safety for every public automobile license issued under the ordinance, a license fee equal to as many times $5 as the number of passengers, exclusive of the driver. In no case, however, is this fee to be less than $25. It is made unlawful for anyone to transport passengers for hire in Schenectady except over the routes set forth in the application pursuant to which the public automobile license was issued. The ordinance does not apply to or govern any automobile let for hire from a livery stable or garage. Any license under the ordinance may be revoked or suspended for failure to operate the automobile in accordance with the schedule set forth in the application. Conviction for violation of any of the provisions of the ordinance is punishable by a fine of not exceeding $150 or imprisonment for one day for each dollar of such fine as is not paid. The measure goes into effect immediately.

Assistant Corporation Counsel Benjamin B. Cunningham, of Rochester, N. Y., has drafted an opinion on the legality of the jitney in Rochester, in which he holds that the licenses which have been issued by the city give the jitneys the legal right to operate there until Jan. 1. He bases his opinion on the alleged failure of the Thompson bill to provide any retroactive clause. He says that there is nothing in the Thompson statute to indicate that it has a retroactive effect or is intended to invalidate acts done under laws in existence previous to its enactment. No doubt is expressed by Mr. Cunningham that the licenses granted by the city are revocable, but he holds that while they are in force they give the holder the right to operate in the streets.

Governor Brumbaugh of Pennsylvania has vetoed the bill to permit electric railways to operate motor buses in opposition to jitneys. He said: "This bill destroys competition. It makes for monopoly. The jitney service is too young and too uncertain to warrant such legislative treatment. Better allow each community to work out this new problem in its own way until experience shows the way to state-wide regulation." The Governor has, however, signed the so-called Patten jitney measure. The bill says: "Each city may regulate the transportation by motor vehicles (not operated on tracks) of passengers or property for pay within the limits of the city or from points in the city to points beyond the limits of the city. In such regulation the city may impose reasonable license fees, make regulations for the operation of vehicles, the rates to be charged for transportation, and

may designate certain streets upon which such vehicles, if operated, must be operated."

The first real test of the legal standing of the jitney in Pennsylvania has begun before the Public Service Commission, which heard the application of the Jitney Service Company to carry passengers and freight in and about Wiliamsport. The company desires a charter, and it was opposed by the Williamsport Passenger Railway, the Vallamont Traction Company, the South Side Passenger Railway and the East Side Passenger Railway. N. M. Edwards, representing the jitney company, said about a thousand persons petitioned for the service. C. LaRue Munson, representing the traction companies, declared there is authority of law which provides for the incorporation of a company to operate motor-driven vehicles. A question to be determined, he pointed out, was whether the jitneys have the right to become rivals of long-established public service companies when they fail to set forth in their application every street and alley which they intend to traverse. He contended that the service furnished by the traction companies was adequate, and that the petitioners for the charter failed to disclose wherein the rights of the protestants were to be protected. Commissioner Pennypacker asked one witness whether, if the railway companies should be forced to surrender their charters because of lack of business brought about through competition, the people of Williamsport would be satisfied with a jitney service alone. The witness said he thought they would. The hearing is continued.

Announcement was made on June 2 that more than 100 jitneys had been registered with the Public Service Commission of Maryland. At the same time the plans for their regulations made by Chief Engineer Charles E. Phelps, were given out. These plans have not been acted upon, but will be considered later by the commission. Mr. Phelps' plan calls for the registration of all such public buses in the city and provides that the owner or operator of each be furnished with an identification card, which will contain comprehensive information about the machine, its owner, the number of passengers it may be permitted to carry, its route and schedule of operation. This card is to be presented for inspection on demand, and failure to produce it is to subject the owner of the bus to a penalty. If, in the opinion of the commission, any public bus fails to render satisfactory service or its service is inadequate, unsafe or improper its operation is to be prohibited. Provisions of the commission as to accidents that apply to electric railways are to apply to the buses.

Three sections of the Fort Worth, Tex., jitney ordinance have been amended. The most important change is in the insurance clause. This now requires jitney operators to furnish a bond of $2,500. The amendment decreases the amount of insurance but substitutes an insurance which is more expensive and highly effective. The jitney owners formerly paid $70 for insurance. It is estimated that the new bond will cost about $150. It will be made payable to the Mayor and will be conditioned so that in any action brought for damages the principal in the bond and the surety may be joined in the same action. The insurance amending clause also authorizes personal securities. The city commission will pass upon the bonds before a license is granted. Another amendment brings the "donation" jitney under the law. The police arrested about fifty operators of donation cars and the cases have been held in the police court awaiting the action of the city commission on the amendments. The third amendment makes it unlawful to operate a jitney without having first executed the bond as provided under the amended ordinance. The amendments become effective on June 16. Attorneys for the jitneymen have announced that they will apply to the Federal Court for an injunction to restrain the city officials from enforcing the new law. They will contend that the amended ordinance is unconstitutional; that the city has no right to revoke existing contracts entered into when licenses for one year were issued under the old ordinance, and that the city has no right to require individuals to insure against damages that are likely to arise.

The Dallas Transit Association was granted a temporary injunction by the Sixty-eighth District Court at Dallas, Tex., restraining the jitney ordinance which was to have become effective May 25, until a hearing could be had with a view to making the injunction permanent. Following the temporary injunction several conferences were held between the jitney men and the city officials in an effort to settle the matter out of court by compromise. No agreement was reached and the case proceeded in Judge Whitehurst's court after he had invited Judge Foree of the Fourteenth District Court and Judge Muse of the Forty-eighth District Court to sit en banc at the hearing. The jitney attorneys contended that the ordinance was unreasonable because it was class legislation and that the license fee was exorbitant. The judges ordered the injunction dissolved and the jitney attorneys immediately gave notice of an appeal. The city attorney then announced that if the attorneys for the jitney men would at once perfect their appeal so the case may be advanced on the docket of the Fifth Court of Civil Appeals to be tried during this term of court, he would ask the City Commission to withhold the enforcement of the ordinance until that time. The jitney men intimated that the case would be prepared within a few days, which means that it would go to trial within the next four weeks as the term of that court then ends. It is understood that the case will come up June 12 and a decision will be reached by July 15, but if no decision is reached by that time the ordinance will be enforced. About 25 per cent of the jitneys dropped out after the decision of the District Court, but a number reinstated service after it was established that the ordinance was not to be enforced immediately.

An ordinance regulating the jitney was carried in Portland, Ore., on June 7 by a big majority. The measure was passed by the City Council last month and was then referred to the people at regular city election. The new measure contains all of the essentials of the measure passed on April 2, and referred to in the Electric Railway Journal of April 17, page 774. According to an investigation completed on June 1 by Municipal Traffic Engineer Kirkpatrick of Portland, there were more jitneys in Portland then than at any previous time. On March 1 there were 350 jitneys in operation, while during the last week of May there were 445. The large buses had been reduced in number from twenty-one on March 1 to fifteen on May 31. The report states that in a twelve-hour day, 875 jitneys crossed the bridges spanning the Willamette River, and operated on the two principal west side routes. In summing up his report Mr. Kirkpatrick says that the jitneys operate on an average of 6.3 hours a day. Of the 445 in the city, only 115 are in service after 10 p. m. Eighty-five of the cars carry "For Hire" signs.

With a total of forty-six damage claims against jitneys during the last two weeks, the Pacific Coast Casualty Company has served notice on many bonded drivers in Seattle of the revocation of their bonds because of reckless driving and disregard of traffic regulations. The claims filed range from $30 to $600.

At the recent meeting of the sub-committee of the City Council of Richmond, Va., in charge of the proposed jitney ordinance, Attorney E. Randolph Williams, for the Virginia Railway & Power Company, said that the city is now confronted with the question of whether it is willing to sacrifice a universal service to all parts of the city and suburbs to foster a limited service, performed in a limited way, in a limited section of the city, from which comparatively few of the city's inhabitants derive benefit. Mr. Williams called attention to the failure of the ordinance to require an indemnity bond or some form of liability insurance to protect the jitney passengers or the pedestrian against injuries resulting from the negligence of the jitney driver or owner. Aside from the unjustifiable hazard which would be imposed upon the public, to relieve jitneys from this obligation would subject the street railway to unfair competition, since the jitney would be allowed to engage in the business of carrying passengers without being compelled to shoulder the risk inherent in the transaction of such business, a risk which the railway at all times assumes.

Judge Samuel B. Kirby, in joint session at Louisville, Ky., held recently that the city of Louisville is wholly within its rights in requiring a bond from operators of jitney buses "even, if necessary, to the extent of $5,000." Judge Kirby granted the plaintiffs a temporary injunction, overruled the city's demurrer to the petition, and held that the jitney operators may run their cars until the litigation is terminated, "the plaintiff to execute bond in the sum of $500." Judge Kirby said that while it may seem that a bond in a sum less than $5,000 "would accomplish the purpose, the court is not authorized to substitute its views for the wisdom

and experience of the General Council acting within the scope of its authority."

Judge Charlton in the Superior Court at Savannah, Ga., has granted a temporary injunction restraining the Mayor and Alderman of Savannah from enforcing the jitney ordinance passed in that city. The injunction was granted on the ground that some provisions of the ordinance are "beyond reason and prohibitory."

It is reported that 100 jitneys ceased operating in New Orleans on June 1 when the ordinance passed recently by the Commission Council of that city to regulate the jitneys went into effect. The ordinance requires a $5,000 liability bond.

Reference has been made previously in the ELECTRIC RAILWAY JOURNAL to the ordinance passed in Little Rock, Ark., imposing a bond of $2,000 for each jitney operated in that city. When the city attempted to put the ordinance into effect, the operators of the jitneys applied to the Chancery Court for a temporary restraining order, which was granted. The case was tried on its merits on May 26 and the chancellor dissolved the injunction annd gave the jitney and the motor bus operators twenty days in which to file their bonds with the city and comply with all the terms of the ordinance, or appeal to the Supreme Court. The twenty days will expire on June 15. From present indications it seems likely that the jitney operators will not carry their case to the Supreme Court, but that they will abide by the terms of the ordinance.

On June 8 the Georgia Railroad Commission rendered a decision taking full supervision over jitney buses in Georgia. Tentative rules for the operation of the jitney have been prepared by the commission and copies of them will be mailed to jitney operators, who will have an opportunity on July 13 to be heard in regard to the rules. The number of jitneys in Atlanta has been decreasing of late, except for sporadic increases on Saturday afternoons and fair Sundays. The maximum number of 105 in operation at any one time was reached about May 4. Of that number only thirty-five remained among fifty-five found in operation about May 24. Of the original jitney bus operators of last February apparently not one remains. The Atlanta Jitney Bus Company, which sought to organize on a permanent basis and exclusively among jitney bus interests in Atlanta and gave promise of dependable service, has found free-lance competition in its own field too much for it and went out of business on June 1.

The jitney was considered by the Board of Police Commissioners of Toronto on May 27 and a draft of the regulations which will be embodied in the jitney by-laws were discussed and passed by the board. No jitney will be allowed to carry passengers in excess of its seating capacity. Each person taking out a jitney license will be required to give a bond of $1,000. In addition a monthly license fee of $1 will be imposed. These regulations will come into effect as soon as the by-law is passed by the Council. The board decided to ask the Council to establish jitney stands at the terminals of all routes. Early action by the Council is requested.

An ordinance has been introduced into the City Council of Peoria, Ill., requiring that the jitney drivers of that city file liability bonds in the amount of $5,000 each. The owners of the jitneys must also specify the exact terminals of their routes, a regular schedule must be maintained and the men must not work more than ten hours a day. The name, age, residence and State number of all jitney drivers must be filed with the city clerk. Stops for passengers must be made not less than 50 ft. nor more than 80 ft. from a "near" crossing. Each car must bear the name of the owner, the route traveled, the terminals, etc., and the interior must be illuminated at night. Penalties of from $25 to $200 for failure to comply with this ordinance are imposed.

The City Council of Des Moines, Ia., has passed an ordinance to regulate the jitney under the law passed by the State Legislature. Most important of the provisions of the measure are those requiring an indemnity bond of each driver and that jitneys shall follow designated routes. It will become effective within ten days upon publication. License fees higher than at present are required. Some important provisions of the ordinance are in brief as follows: A fine of not more than $100 or imprisonment for not to exceed thirty days is the penalty for violation. Applicants for jitney licenses must file schedule showing time of departure from stated and fixed terminals, the size of the car, its horsepower, etc. Applications are to be referred by the commissioner of public safety to the Council, which may deny an application providing it appears that the driver is inexperienced or that the territory in which he desires to operate is already supplied with ample facilities for transportation. For a car with a capacity of five or less the license per annum is $15; for more than five and less than eight, $20; more than seven and less than sixteen, $25; more than fifteen and less than thirty, $30; thirty and more, $35. Buses must be brought to full stop before crossing street railways, interurban, or steam railroad tracks. No more passengers may be carried than the actual seating capacity

About 130 jitney licenses have been issued to date in Des Moines. Not all of these are now in use, however. The new ordinance provides that licenses now in force may be surrendered and a part of the license fee returned if application is made within fifteen days. The popularity of the jitney bus in Des Moines has been on the wane for several weeks, and the new ordinance may mean the end of all except the larger cars of which several already are operating as provided by the ordinance.

THE JITNEY IN ILLINOIS

Text of Order of Illinois Commission Restraining Jitney in Jacksonville

On June 3 the State Public Utilities Commission of Illinois issued a formal order in connection with the case of the Jacksonville Railway and W. B. Miser vs. L. F. O'Donnell, doing business as the Motor Transportation Company. The hearing before the commission on June 2 and the opinion expressed by Commissioner Owen P. Thompson were reported in the ELECTRIC RAILWAY JOURNAL of June 5, page 1093. The order entered by the commission follows:

"This cause came on to be heard upon the complaint filed by the Jacksonville Railway, in which W. B. Miser afterwards joined, and upon the answer of the defendant, L. F. O'Donnell, to said complaint, the complainants appearing upon the hearing by Messrs. Green and Palmer, their attorneys, and the defendant appearing by T. J. Condon, Esq., his attorney.

"It appears from the evidence that the defendant, L. F. O'Donnell, is the owner of a number of automobiles, which since about March 28, 1915, he has used for the transportation of persons for hire from and to points within the city of Jacksonville in this State, and that under the name of the Motor Transportation Company he has been furnishing what is commonly known as a jitney bus service.

"It further appears that the respondent has advertised in various newspapers and through printed circulars that he is engaged in the business of transporting passengers by motor buses over and along certain designated streets in Jacksonville and in such advertising has specified the routes to be taken by his motor buses, the rates of fare to be charged and a time schedule, and that the respondent has held himself out to the public as a common carrier for hire and offered to transport all persons desiring to ride along the routes taken by his said motor buses.

"From the evidence in this case, the commission finds that the respondent owns, controls, operates and manages within this State for public use, a number of automobiles which he is using for the transportation of persons for hire between points within this State, and that in the conduct of such business the respondent is a common carrier of persons and is a public utility within the meaning of the act entitled 'An Act to Provide for the Regulation of Public Utilities,' approved on June 30, 1913, and that as such public utility the respondent is subject to the provisions of said act.

"The commission further finds that said respondent was not engaged in such business, nor engaged in performing any public service of that character within this State prior to March 28, 1915, and that the said respondent has not obtained from this commission a certificate that public convenience and necessity require the transaction of such business.

"It is therefore ordered, that the said respondent, L. F. O'Donnell, cease and desist from carrying on the business which he is carrying on in the manner aforesaid, of transporting persons for hire between points within this State,

until he shall have applied for and obtained from this commission a certificate that public convenience and necessity require the transaction of such business."

UNITED RAILROADS PROTESTS MUNICIPAL SCHEDULE

The United Railroads, San Francisco, Cal., has protested to the Board of Supervisors against the excessive use of the outer loop at the foot of Market Street by cars of the San Francisco Municipal Railway. The original agreement covering this matter provides that the United Railroads divide with the city the cost of maintaining the outer track on lower Market Street. It is stipulated further that the United Railroads shall furnish power to the city at cost, or, at least at a rate not to exceed 1 cent per kw-hr., which is the rate the city pays the Pacific Gas & Electric Company. It is also stipulated that the United Railroads shall not operate cars over the tracks faster than one every ninety seconds; no limit is placed on the number the city may operate. At the time this contract was drawn up both parties to the agreement operated the cars of two different routing over the tracks in question. The arrangement was satisfactory until a second bond issue was voted and the Municipal Railway put the cars of two additional routes on the lower Market Street tracks. This has placed the city in the position of operating 1050 cars a day over the outer tracks as against the United Railroads 504, while the company still is paying one-half of the maintenance charges.

The United Railroads on May 25 petitioned the superior court for a permanent injunction to prevent the Municipal Railway from operating its Van Ness Avenue cars over the outer tracks and loop on lower Market Street, and from issuing or accepting transfers on cars operating on that line.

MISSOURI FARE REDUCTION RESTRAINED

Three judges of the district court of the United States who collaborated in hearing a petition for a restraining order against the enforcement of commutation rate orders directed to the Kansas City, Clay County & St. Joseph Railway, have issued the injunction, and incidentally suggested that the Public Service Commission of Missouri had no authority to compel an interurban to experiment with commutation rates on the supposition that the lower rates would bring increased revenues. For the purpose of determining rates, the commission had ascertained the value of the railway's property to be $3,900,000, the net income from the first full year of operation $242,488.22, or a return of 6.2 per cent on the determined valuation.

The court declared that it need not now consider the question of valuation, and proceeded to consider the rate order as based on the valuation. The court suggested that the returns on rates established by the commission under the law must be remunerative or at least adequate, but said that "the commission comes dangerously near holding the contrary." The court quoted from the decisions in the North Dakota and the West Virginia cases by the Supreme Court, and suggested: "It seems clear that that right (power of the State to require commutation rates in general) cannot be created by local public demand or interest; that it cannot be justified by the commission's views of the probable beneficial effects of such rates upon the company's business; because that would constitute an invasion of the right of the company to conduct and manage its own affairs, subject to a proper exercise of the power of regulation."

In reference to the increase of business from suburban incomers, the court suggested that if the rate were allowed, it would be several years before many suburban homes could be built; and if the rate was later found unjust, hardship would be done to persons who built with the confidence that the rates would be permanent.

The court, in granting the temporary injunction, declared that the views expressed must not be taken as forecasting the judgment of the court on final hearing.

One-Man Cars in Jackson.—The Jackson Light & Traction Company, Jackson, Miss., is operating three one-man cars.

One-Man Cars in Tulsa.—The Tulsa (Okla.) Street Railway has served notice upon the public that in consequence of jitney competition conductors will be withdrawn from all lines except the Main Street line and that cars will be operated by one man.

Accident on Queensboro Bridge.—Several passengers were injured in a collision between cars of the Third Avenue Railway and the New York & Queens County Railway which occurred about 6 p. m., on June 6, at the underground loop at the Manhattan end of the Queensboro Bridge.

One-Man Cars in Salem.—Following a statement by T. L. Billingsley, superintendent of the Portland, Eugene & Eastern Railway, Portland, Ore., that the company is losing $700 a month in the operation of its lines in Salem the City Council passed an ordinance authorizing the use of one-man cars.

Plan to Eliminate Stops in St. Louis.—The United Railways, St. Louis, Mo., plans to eliminate 686 so-called "useless stops" on its system, thus enabling it to shorten its running schedules from four to five minutes on each line. Application to abandon the stops has been filed with the Public Utilities Commission of Missouri.

Fare Increases Suspended.—The Public Service Commission of Massachusetts has suspended until July 1 the proposed establishment of 6-cent fare units by the New Bedford & Onset Street Railway and the Norfolk & Bristol Street Railway. By a previous order the increase on the Norfolk & Bristol Street Railway had been suspended until June 1.

Trail Cars Ordered on Interurban.—Trail cars must be carried by the Denver & Interurban Railroad between Denver and Boulder whenever the number of passengers requires extra cars, according to an order by the State Public Utilities Commission. Trail cars will be attached at Broomfield when the seating capacity of the original car leaving Denver or Boulder is filled.

Workmen's Fare Reduction.—The Public Service Commission for the Second District of New York has granted to the Fonda, Johnstown & Gloversville Railroad the right to reduce the price of the workmen's commutation tickets good for a trip between Gloversville and Johnstown in the morning, noon and in the evening, from 6¼ to 5 cents. The new rate has gone into effect.

Advertising Municipal Band Concerts.—By arrangement between the city and the San Antonio (Tex.) Traction Company, San Antonio is giving concerts at San Pedro Springs in the suburbs, while the San Antonio Traction Company advertises the concerts in the local papers. The railway does not mention its own name or trolley service, but this is needless since those who go to the concerts will use the trolley. The fact that a carhouse is also near the Springs makes it easy to meet any demands for service.

Decision in New York Suburban Fare Case.—The Court of Appeals of New York has unanimously affirmed the Appellate Division's order annulling upon certiorari an order of the Public Service Commission, Second District, for a reduction from increases in commutation rates established by the New York Central Railroad within the electrified zone adjacent to New York City. The court said that "the naked fact that a railroad has established and continued a rate for a limited time does not justify the conclusion that it was profitable."

The Twin City Pamphlet.—"The Twin Cities, 1915," has been issued. The publication is bigger, brighter and better than ever. Each year it seems that the last of the possible changes has been rung in the making of this booklet, but the next year rolls around only to bring forth a more striking combination than was contained in any of its predecessors. Of the publication 50,000 copies are printed each year. For the most part the circular is distributed within a radius of 300 miles of the Twin Cities. The Twin City publication is the *ne plus ultra* of electric railway vacation bookets. In this respect the majestic palm seems to be borne by A. W. Warnock, general passenger agent of the company, and borne by him alone.

Deciding on a Type of Car for Toronto.—Some months ago the Ontario Railway Board ordered the Toronto (Ont.) Railway to construct fifty new cars and have them in operation by June 1. Following the order, the union of electric railway employees asked the board to order the abolition of the running board on the open cars, and the railway board, in view of the fact that a new type of car is being

looked for, decided to leave the matter of the new cars in abeyance. The chairman of the board now says that it would be inconsistent to expect the street railway to build cars when the board has not decided what was the proper type of car to build. He also mentioned the fact that the engineers of the board, the city and the company had come to the United States to inspect a type of steel car which it was thought might prove satisfactory in service in Toronto.

Accidents in Greater New York.—According to a report by the Public Service Commission of the First District of New York, in January, February, March and April, 1914, there were thirty-seven fatal surface railway accidents in Greater New York. In the same period, for the current year, twenty-nine lost their lives through car collisions or accidents in which the trolley cars played the chief part. The record shows that in the first four months of 1914 there were 10,650 mishaps to persons and property on the surface car lines, and for the same period this year there were 8,597 accidents other than fatal. The total number of cars run at each period is not given in the report. During the current year the near-side stop has been in force.

I. C. C. Decision in Electric's Favor.—The Interstate Commerce Commission recently decided that the Crosby Transportation Company by selling through tickets over the line of the Grand Trunk Railway between Grand Rapids and Milwaukee and refusing to do so via the Grand Rapids, Grand Haven & Muskegon Railway (electric) unduly discriminates against the electric in favor of the steam road. The Crosby Transportation Company is an independent company, but is the exclusive carrier for the Grand Trunk Railway between Milwaukee and Grand Haven. The docks at Milwaukee used by that company are owned by the Chicago, Milwaukee & St. Paul Railway, but are leased by the Grand Trunk. The dock at Grand Haven is owned by the Grand Trunk. It was urged by the latter that its ownership of the dock at Grand Haven should give it the right to exclude its competitor from its use and enjoyment.

Accident in San Francisco.—A two-car train ran away down the Fillmore Street hill, San Francisco, Cal., on June 7, severely injuring several passengers. There were no fatalities, however. The accident was not caused by breakage, but by the train at the top starting before the train below connected with the cable. An investigation by the United Railroads places the blame on the starter and on the motorman of the upper train for starting before receiving the signal from below. About fifty passengers were on the runaway. Some were injured in jumping, while others were hurt in the collision with the train standing at the foot of the incline. The passengers on the loaded train below had time to leave before the crash. The company is installing a device necessitating the throwing of the lever after coupling below and before the train above can start down. Car operation on Fillmore Street was described in the ELECTRIC RAILWAY JOURNAL of May 22, page 977.

Recommendations for Street Traffic Regulation.—The street traffic committee of the Safety First Federation of America, at its meeting in Detroit on June 4 and 5, prepared twenty recommendations concerning street traffic regulation for submission to the national federation at the fall meeting. These recommendations are to be included in the traffic ordinance that is proposed by the committee for adoption everywhere. The recommendations include the following: Standard code of traffic signals, parallel and angular parking of automobiles with fifteen to sixty minute time limit, frosted or colored glass in front of every reflected light, designated safety zones and crosswalks, red lights on rear of horsedrawn vehicles, authorized police control of pedestrian traffic, standard accident reports by all cities, and standardization of size, color, design and means of attachment of all street traffic signs, including those for schools, hospitals, churches, safety zones, railroad and street railway crossings, etc. The meeting was attended by commissioners of public safety, police department heads and other safety-first workers. Joseph A. McGowan, auditor of the Indianapolis Traction & Terminal Company; F. W. Bacon, vice-president of the Kentucky Traction & Terminal Company, and W. E. Cann, of the Detroit United Railway, represented the street railways at the meeting.

Personal Mention

Mr. C. J. Chadwick has resigned as general freight and passenger agent of Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, Minneapolis, Minn., and his office has been abolished.

Mr. L. G. Ireland has been appointed manager of the Brantford (Ont.) Street Railway in addition to the office which he has previously held as manager of the Hydro-Electric System of Brantford.

Sir Henry Lumley Drayton, K. C., who was knighted by King George on June 3, is chief commissioner of the Board of Railway Commissioners for Canada, and was formerly Corporation Counsel for the city of Toronto, Ont.

Mr. Frederick W. Whitridge, president of the Third Avenue Railway, New York, N. Y., returned from England on the *Philadelphia*, which docked in New York on June 3. Mr. Whitridge went abroad on the *Lusitania* on April 4.

Mr. R. V. Campbell has been appointed traveling freight and passenger agent of the Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, Minneapolis, Minn. Mr. Campbell formerly held a similar position at Des Moines, Ia., with the Minneapolis & St. Louis Railroad.

Sir John Strathhearn Hendrie, C. V. O., Lieutenant-governor of Ontario, was knighted by King George on June 3. He is one of the foremost figures in public life in Canada. From 1905 to 1912 he held the position of chairman of the railway committee of the Legislative Assembly and was also a member of the Hydro-Electric Power Commission of Ontario.

Mr. C. B. Fairchild, Jr., executive assistant, Philadelphia (Pa.) Rapid Transit Company, is the author of a paper entitled "The Opportunities of a Special Librarian," read this week at the annual meeting of the Special Librarians' Association at Berkeley, Cal. Mr. Fairchild refers to the demand from the administrative head of public service and private corporations and of city, state and national governments for specific information relative to special or specialized subjects. This is a growing need and is recognized in some of these corporations by the appointment of men working under such titles as executive assistants, special librarian, statistician, etc. Mr. Fairchild calls attention to the need for such work and to the increasing demand for it.

OBITUARY

John G. Mackintosh, a director in the Greenfield Gas & Electric Company, the Holyoke Street Railway, and the Springfield (Mass.) Street Railway, is dead. Mr. Mackintosh was born in Tariffville, Conn., in 1846. In 1876 he established the banking firm of J. G. Mackintosh & Company, Springfield, Mass., and in 1885 organized the Springfield Safe Deposit & Trust Company, of which he had since been president.

Charles F. Libby, formerly president of the Portland (Maine) Railroad, died at his home in Portland on June 4 at the age of seventy-one. He had engaged in law practice in his home city since 1866, was president of the American Bar Association in 1909-10, and had also been Mayor of Portland and president of the board of overseers of Bowdoin College. He headed the Portland Railroad Company for eight years, retiring about three years ago.

The report of the Hydro-Electric Power Commission of Ontario for the year 1914 on the electric railway department states that resolutions had been received from 138 townships, thirty-eight villages, forty-two towns, eleven cities, four police villages, and seven miscellaneous committees, such as boards of trade, etc., asking for surveys, reports and estimates on proposed lines. Two survey parties had been at work for almost the entire year making preliminary surveys of some 1200 miles of line. The information so obtained had been plotted and used for the purpose of preparing estimates on the cost of roadbed construction. In making the surveys topography was taken for approximately 400 ft. on each side of the traverse line. When this information was plotted the proposed lines were then projected and quantities figured along such lines.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

FRANCHISES

Monterey, Cal.—The Monterey & Pacific Grove Railway has received from the Commission a certificate of public convenience and necessity to operate under franchises granted by the city of Monterey and the city of Pacific Grove.

Chicago, Ill.—The Chicago Surface Lines has asked the Council in Chicago for a franchise to extend its Chicago Avenue line to the lake.

Quincy, Ill.—The Quincy & Western Illinois Electric Railway has received from the Council a three years' extension of time on its franchise in which to build its proposed line between Quincy and Niota. [Jan. 23, '15.]

Newton, Mass.—The Middlesex & Boston Street Railway has asked the Public Service Commission of Massachusetts for its approval of the relocation of its tracks on Woodward Street between Boylston Street and Lincoln Street, Newton.

Springfield, Mo.—The Springfield & Western Railroad has received from the Council an extension of time on its franchise to construct a line between Springfield and Carthage.

Columbus, Ohio.—The East Linden Electric Railway has received a twenty-five year franchise from the Council for the construction of two lines through the northern section of Columbus. One line begins at the Leonard Avenue viaduct and extends northeast through Shepard to the bank of Alum Creek. The other line begins at the Leonard Avenue viaduct and extends through Joyce Avenue and Atcheson Avenue, Columbus, to East Linden. [June 5, '15.]

Urbana, Ohio.—The twenty-five-year franchise granted the Ohio Electric Railway in Urbana was approved in a referendum vote on June 1 by a majority of 258. At an election two months ago the franchise was defeated by five votes.

Toronto, Ont.—The franchise of the Metropolitan division of the Toronto & York Radial Railway on Yonge Street, north of the Canadian Pacific Railway tracks on Farnham Avenue, will expire on June 25. The franchise was granted to the company for a period of thirty-one years. The city has not yet laid down a policy in reference to the portion of the road which will fall into its hands. The Board of Control will take up the matter at once.

Providence, R. I.—The Rhode Island Company has received a franchise from the Council to lay a double track on North Main Street between Market Square and Waterman Street, Providence, to connect with the East Side tunnel.

Petersburg, Va.—The Council of Petersburg has adopted the ordinances introduced at a meeting recently, granting electric railway franchise rights on Bollingbrook Street and Wythe Street, asked for by the Petersburg & Appomattox Railway and the Petersburg & James River Corporation. These franchises will be sold to the highest bidder.

TRACK AND ROADWAY

Tucson (Ariz.) Rapid Transit Company.—Plans are being considered by this company to extend its University Avenue line on Park Avenue to and along the Speedway.

***Melbourne, Ark.**—Residents of Melbourne and vicinity have formed the Community Improvement Association with the object of promoting the construction of an electric line from some point on the Iron Mountain Railroad. It was voted to guarantee a right-of-way and a $10,000 bonus. A. P. Golden, secretary.

Pacific Electric Railway, Los Angeles, Cal.—Plans are being considered by this company to extend its line from San Bernardino to East Highland and Del Rosa.

Jacksonville (Fla.) Traction Company.—Work will be begun at once by this company rebuilding the track on its South Main Street line from Michigan Avenue to the terminal at Nichols Park.

Jacksonville & Florida Railway, Jacksonville, Fla.—Financial arrangements have been made to build the first section of 10 miles of this company's line between Jacksonville and Providence, and construction has been begun. A. W. MacKinlay, president. [May 8, '15.]

Milton, Fla.—H. S. Laird, Milton, advises that, owing to financial conditions, the project to build an electric railway from Milton to Bagdad has been entirely abandoned. [Jan. 31, '14.]

Jacksonville & St. Augustine Public Service Corporation, St. Augustine, Fla.—T. R. Osmond, general manager of this company, states that bonds have been taken and a definite proposition for the construction of this company's line between Jacksonville and St. Augustine and the building of a power plant has been submitted to an engineering concern in New York. An estimate will be made by the engineering company of the cost of building and equipping the plant and as soon as this work is completed the contract will be signed and work will be begun. [March 13, '15.]

Waycross Street & Suburban Railway, Waycross, Ga.—Plans are being made to begin work at once on the construction of this company's extension to Gilchrist Park.

Freeport Railway & Light Company, Freeport, Ill.—This company plans to begin at once the construction of its extension on Galena Street, Freeport.

Chicago & Joliet Electric Railway, Joliet, Ill.—Work will be begun at once by this company on the extension of its Hickory Street line to Theiler's Park. The line will extend from its present terminus at Smith Street, east to Broadway and north on Broadway to Theiler's Park. Township officials have promised a franchise and the consent of property owners is now being obtained.

Chicago, Peoria & Quincy Traction Company, Peoria, Ill.—Plans are being made for the floating of $3,000,000 of bonds for the completion of this company's line. Plans are also under consideration for the location of the company's shops at Quincy. [May 1, '15.]

***Salina-Northern Railroad, Kansas City, Kans.**—It is reported that this line now under construction in Kansas will use motor cars instead of steam equipment. Track construction on the line between Salina and Osborne will begin July 1.

Salina (Kan.) Street Railway.—Ties are being distributed by this company for its line to the new union station at Salina. As planned, the line is to branch off from the Ninth Street line at Park Street, extend to Thirteenth Street and thence north to the union station. The company has applied for a permit to run street cars on Park Street.

Arkansas Valley Interurban Railway, Wichita, Kan.—Plans are being made by this company to build an extension of its lines to Salina and one to Winfield, which will have a branch from Mulvane to Wellington. Following these improvements an extension to El Dorado will be built.

Kentucky Traction & Terminal Company, Lexington, Ky.—The Board of City Commissioners has ordered this company to proceed at once relaying its tracks on South Limestone Street, Georgetown Street and Dewees Street, Lexington.

Gretna, La.—Edward L. Slattery, New Orleans, reports that surveys have been begun and application for a franchise will be made for the construction of an electric railway from the intersection of Copernicus Avenue and Front Street, Gretna, extending on Copernicus Avenue to Eleventh Street, out Eleventh Street by reverse curve to Nicholls Avenue to Twenty-third Street, at which point the road will extend northeast and connect with the New Orleans, Southern & Grand Isle Railway. [May 29, '15.]

Bay State Street Railway, Boston, Mass.—This company is relocating its tracks on lower Broadway, Chelsea.

Fort Scott & Nevada Light, Heat, Water & Power Company, Nevada, Mo.—This company is rebuilding its line on North Washington Street, Nevada. Ties for the entire line have been ordered and work is progressing rapidly.

Albuquerque (N. Mex.) Traction Company.—Among the improvements planned by this company is the repairing of curves and switches and overhauling its track in general.

United Traction Company, Albany, N. Y.—This company plans to spend $165,000 for new track this summer. Rails, ties and material have been ordered for a double track to be laid in Central Avenue from Lark Street west to Watervliet Avenue, Albany, a distance of 8500 ft. Work will be begun as soon as the material is received.

Interborough Rapid Transit Company, New York, N. Y.—Construction work on the Steinway tunnel, connecting Manhattan and Queens, is approaching completion, and the Public Service Commission for the First District of New York expects to order the beginning of temporary operation through the tunnel about June 15. For the last year this tunnel has been undergoing reconstruction to fit it for operation as a part of the new subway system. It will be operated by the Interborough Rapid Transit Company, with free transfers to and from the existing subway. During temporary operation trains will run back and forth between the temporary termini at Jackson Avenue and Van Alst Avenue, Long Island City, and at a point under Forty-second Street between Lexington Avenue and Third Avenue, Manhattan. The tunnel is a two-track line, and at the Manhattan end passengers will be brought to the surface by an escalator.

Brooklyn, N. Y.—The Public Service Commission for the First District of New York has directed its counsel to apply to the Appellate Division of the Supreme Court for the legalization of the Bushwick Station, East New York route. This is the eastern part of the so-called Eastern District subway line. This line begins at Sixth Avenue, Manhattan, and runs under Fourteenth Street and the East River to North Seventh Street, Brooklyn, through North Seventh Street to Metropolitan Avenue, through Metropolitan Avenue to Bushwick Avenue, and thence through Johnson Avenue and the Long Island Railroad right-of-way to East New York. The western end of the line, covering the underground portion, has already been legalized, but the commission found it impossible to get the consents of two property owners necessary to legalize the elevated railroad portion of the route. The application to the Appellate Division will be made at once, and it is not thought that there will be any delay in the completion of the road as the elevated portion, upon which work has not yet been begun, can be constructed in much less time than the underground parts.

Cincinnati (Ohio) Traction Company.—Plans are being prepared by City Engineer Krug for the construction of this company's extension to Bond Hill. It has not yet been decided whether the track will be laid through Avon Field or on Paddack Road. It will cost $70,000 to build a boulevard through the park property, and for that reason it is believed the Paddack Road route will be chosen. Work will be begun as soon as the Council determines on the route.

Toronto, Ont.—At a meeting of the Council on May 31 it was moved that the Board of Control report funds for the laying of a permanent street railway line on Bloor Street West, west of Dundas Street. The motion was referred to the Board of Control, as there is a legal difficulty in the way. The necessary legislation was not obtained and, as a result, the work has been tied up until a method of financing is devised.

Portland, Ore.—Steps are to be taken at once by the Council to confiscate a bond of $10,000 furnished by George F. Heusner to guarantee the construction of an electric line from Kenton to the West Side business district of Portland under the provisions of a franchise received by Mr. Heusner. The Council recently received a request for an extension of time in which to build the line but by unanimous vote refused any extension. The bond was given to guarantee completion of the line within eighteen months after the granting of the franchise. The eighteen months expired on June 3. [Jan. 9, '15.]

Eastern Pennsylvania Railways, Pottsville, Pa.—This company reports that it expects to build 2 miles of track between Pottsville and St. Claire.

***Gallatin, Tenn.**—In connection with the project to build an electric railway from Gallatin, Tenn., to Horse Cave, Ky., it is stated that if the sum of $100,000, which is needed to go ahead with the project, is raised, Nashville, Tenn., will supply a similar amount and the line will be built.

Dallas (Tex.) Southwestern Traction Company.—A subscription of $3,000 has been raised for the purpose of surveying this company's extension from Glen Rose to Stephenville. This is part of a plan to build an electric railway from Dallas to Brownwood. [May 22, '15.]

Houston, Richmond & Western Traction Company, Houston, Tex.—Arrangements are well under way for the construction of this company's line from Houston to Richmond. Residents of Richmond have assured the promotors of a cash bonus of $10,000, a right-of-way through the county and a terminus site of 3 acres. E. Kennedy, Houston, is interested. [May 29, '15.]

Salt Lake & Utah Railroad, Salt Lake City, Utah.—Plans are being considered by this company to build an extension of its lines from Fourteenth South Street, Salt Lake City, through Hunter, Granger, Pleasant Green and other points into the heart of the agricultural district, 10 miles.

***Beckley, W. Va.**—H. G. Scott, Charleston, has submitted to the Raleigh County Business Men's Association plans to construct an electric railway from Fayette Station on the Chesapeake & Ohio Railway to Beckley, 35 miles. The route extends via Mount Hope, Oak Hill, Glen Jean, Fayetteville and other points. A committee consisting of C. L. Beckner, T. E. Bibb and Ernest Chilson, all of Beckley, has been appointed to consider the plan.

Charleston (W. Va.) Interurban Railroad.—This company has sold $750,000 of 6 per cent notes, the proceeds of which are to be used to build an extension of its lines from Charleston to Montgomery, 24 miles.

Princeton (W. Va.) Power Company.—Work has been begun by this company laying tracks on its line between Princeton and Bluefield, 12 miles.

***Superior, Wis.**—Plans are being considered to build an electric railway from Superior to Bayfield. It is said that more than half the money needed for the construction has been subscribed. L. E. Davis, Bayfield, is interested.

SHOPS AND BUILDINGS

Northern Massachusetts Street Railway, Athol, Mass.—Headquarters for the Gardner and Templeton divisions of this company will be established next week at East Templeton and the use of the carhouse at Westminster will be discontinued. A new switchboard has been installed in the carhouse at East Templeton and an addition built to care for the cars which have been kept at Westminster.

Twin City Rapid Transit Company, Minneapolis, Minn.—President C. G. Goodrich announces the purchase of a terminal site by this company in the heart of the Minneapolis business district for which a cash consideration of $1,100,000 was paid. The new terminal block is 330 ft. by 330 ft. and is bounded by Marquette Avenue, Second Avenue, Seventh Street and Eighth Street. The complete terminal plan contemplates not only suburban line operation but a modification of the downtown lines and rearrangement of the loops so as to relieve congestion.

Brooklyn (N. Y.) Rapid Transit System.—The Public Service Commission for the First District of New York has awarded the contract for the completion of construction and station finish in portions of the Fourth Avenue subway, Brooklyn, to D. O. Serber for $40,676.25. The work covered by this contract will be done in the next three months and will in no way interfere with the beginning of operation in the Fourth Avenue subway, which is scheduled for June 15. The work consists mainly in completing the station finish and other parts of the subway structure between Hanson Place and Butler Street.

Eastern Pennsylvania Railways, Pottsville, Pa.—This company reports that it expects to build a 208-ft. extension to its present carhouse in Pottsville.

Texas Traction Company, Dallas, Tex.—Officials of this company and the Southern Traction Company and Stone & Webster executive officers held a conference on June 2 at which plans were laid out for the construction of the new union terminal for interurban lines at Dallas. Under the terms of the franchise granted Stone & Webster by the city for the terminal, actual construction must be begun before Oct. 20.

Manufactures and Supplies

ROLLING STOCK

Boston (Mass.) Elevated Railway has ordered one flat car-body from the Laconia Car Company.

Ohio Electric Railway, Cincinnati, Ohio, has ordered one 63-ft. excursion type car from the Cincinnati Car Company.

Union Electric Company, Dubuque, Ia., is rebuilding eight single-truck cars into one-man cars in its own shops.

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind., has ordered one all-steel car, 32 ft. 6 in. over corner posts, from the Cincinnati Car Company.

Detroit (Mich.) United Railway has ordered two of its standard type 60-ft. limited interurban cars from the Niles Car & Manufacturing Company. The cars will be duplicates of the previous order.

Parkersburg, Marietta & Interurban Railway, Parkersburg, W. Va., has ordered two additional all-steel interurban cars from the Cincinnati Car Company. These cars are exact duplicates of those placed in service some months ago by the railway company.

Sioux City Service Company, Sioux City, Ia., will build this year four cars of its standard, single-end, pay-as-you-enter type. These cars are 31 ft. over corner posts and 8 ft. 6 in. wide with a 5 ft. 6 in. front vestibule and a 6 ft. 8 in. rear vestibule. The framing is of semi-steel and the body is of the monitor roof type.

TRADE NOTES

McKay Company, New York, N. Y., bankers, have removed their offices from 55 Wall Street to the twenty-second floor of the Bankers' Trust Company Building, 14 Wall Street.

Edwin G. Hatch, New York, N. Y., has recently supplied the Chicago, Milwaukee & St. Paul Railway with a number of seamless copper splicing sleedes to provide the splices in its transmission lines under construction in the West.

Graphite Lubricating Company, Bound Brook, N. J., has moved its factory in Bound Brook to a larger location two miles from the old plant covering a plot of about 500 ft. x 200 ft., where it will manufacture its "Bound Brook" and Nigrum graphite and bronze oil-less bearings and bushings.

Frank Ridlon Company, Boston, Mass., electrical engineer, manufacturer and repairer of electrical apparatus has removed its New York office to Suite No. 307 Engineering Building, 114 Liberty Street. George L. Smead is manager of the vacuum cleaner and fixture department, Harry De Steese of the export and supply department.

E. G. Long Company, Inc., New York, N. Y., has appointed John A. Warris, formerly assistant treasurer, as secretary to succeed F. Van Anden, resigned. Mr. Warris has been associated with this company for over fifteen years. Robert C. Riddick, works manager at the Kingston foundry, has been appointed a director of the company, succeeding Mr. Van Anden.

Ellcon Company, New York, N. Y., has received an order for porcelain enameled stanchions and Aero-metal fittings for the third lot of 100 cars ordered by the New York Municipal Railway, the same equipment as supplied for the previous 200 cars. This company has also received an order from the Interborough Rapid Transit Company for porcelain enameled barriers and Aero-metal fittings for its 478 new cars.

Alexander Milburn Company, Baltimore, Maryland, manufacturer of high power portable lights and oxy-acetylene welding apparatus, has acquired the business of the Wells Light Manufacturing Company, Jersey City, N. J. Repair parts for outstanding Wells lights will be manufactured and supplied in the future by Alexander Milburn Company, from its Baltimore factory, and complete Wells oil lights will also be furnished where desired, in conjunction with the standard Milburn acetylene lights.

ADVERTISING LITERATURE

Sangamo Electric Company, Springfield, Ill., has issued a catalog which describes its exhibit of electric meters in the Palace of Machinery at the Panama-Pacific Exposition.

General Electric Company, Schenectady, N. Y., has issued Bulletin No. 42552, on the subject of motor generator sets. The bulletin is attractively designed and includes numerous illustrations of various types of motor-generator sets, also a general description of this type of apparatus.

Altheimer & Rawlings Investment Company, St. Louis, Mo., has reprinted in pamphlet form the talk of Richard McCulloch, president and general manager of the United Railways, St. Louis, before the Bond Men's Club of St. Louis in which he discussed the problems of the company.

Ohmer Fare Register Company, Dayton, Ohio, has issued a folder on its fare register system. The folder contains a long list of electric railways which use this system. Enclosed with the folder is a form sheet for the convenience of making estimates of this system by stating the various fares collected on the line and also other necessary operating data.

Fargo Manufacturing Company, Inc., Poughkeepsie, N. Y., has issued bulletin Nos. 400 and 800 which show a variety of the latest designs in its electrical wiring. These connections are designed to do away with the surging in the line owing to bad contacts at the joints and to prevent loss of service traceable to high resistance or broken joints. These connecting devices secure low resistance joints owing to the fact that they are three times the area of wire or cable at the joint.

Esterline Company, Indianapolis, Ind., has issued catalog No. 364 describing its various types of "Golden Glow" incandescent headlights. The catalog contains an illustration made from an unretouched photograph of a street well illuminated for a distance of four blocks by one of these headlights on a car of the Indianapolis Traction & Terminal Company. In this type of reflector the light from the bulb passes through the glass, strikes the silvered surface and is reflected back through the glass and out in front of the lamp. In passing through the glass the violet and blue rays are absorbed in the glass and subtracted from the beam, leaving a shaft of golden yellow light. Even in a dense fog the light can be seen at a great distance. For electric railway service dash type headlights are burned in series with interior bulbs and will give a projection of light from 350 ft. with a 23-watt bulb to 750 ft. with a 56-watt bulb. The interurban headlight can be operated in series with resistance or interior bulbs. It will project an intense but non-blinding beam sufficient to distinguish objects at a distance of from 900 to 1200 ft. Use of these headlights in series with tungsten bulbs greatly reduces the effect of fluctuating voltage and is a material economy in current.

Cook Railway Signal Company, Denver, Col., has issued a catalog describing and illustrating its safety automatic gate for highway crossings. This gate operates practically the same as an upper quadrant signal. For electric lines the most common method of control is by means of either track instruments or trolley contactors. The functions performed by the gate and the results obtained by these methods are the same as in the "track circuit" installations. The journal where the gate arm is attached to the mast is 13 ft. above the foundation. When the gate arm is lowered it assumes a horizontal position with "tell-tales" hanging therefrom, which come down to about 5 ft. of the roadway. These tell-tales are made of crucible steel wire, wound in spring form, so as not to catch or hang to any object. Since the rigid arm is 13 ft. above the roadway, it is in the clear, and will not injure any one if it should come down, for a vehicle is directly under it. The bell starts ringing as soon as the arm moves to the danger position. The arm moves to the danger position very slowly, taking about six seconds, so it will not frighten horses as it might if it should descend rapidly. In the top of the mast is a red lens which throws a ray of light parallel to the public highway, so that at night time it can be plainly seen from a distance. In the head is also arranged a shaded white light which shines down upon the arm and "tell-tales" and lights up the crossing, making it visible during darkness. The gate is substantially and heavily made. The mechanism operates by direct current or alternating current, whichever is available, or by low voltage storage batteries.

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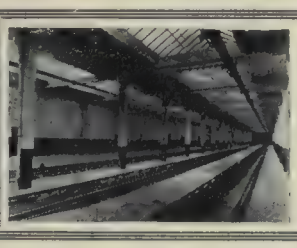

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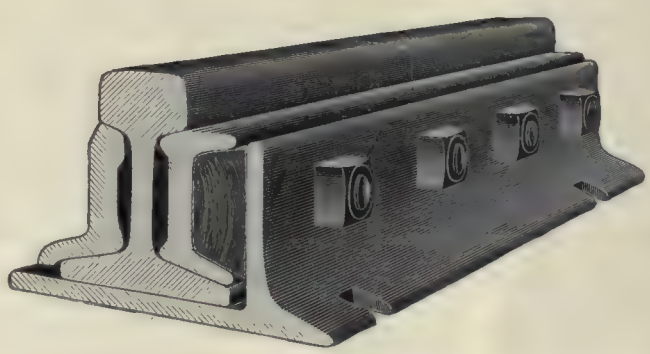

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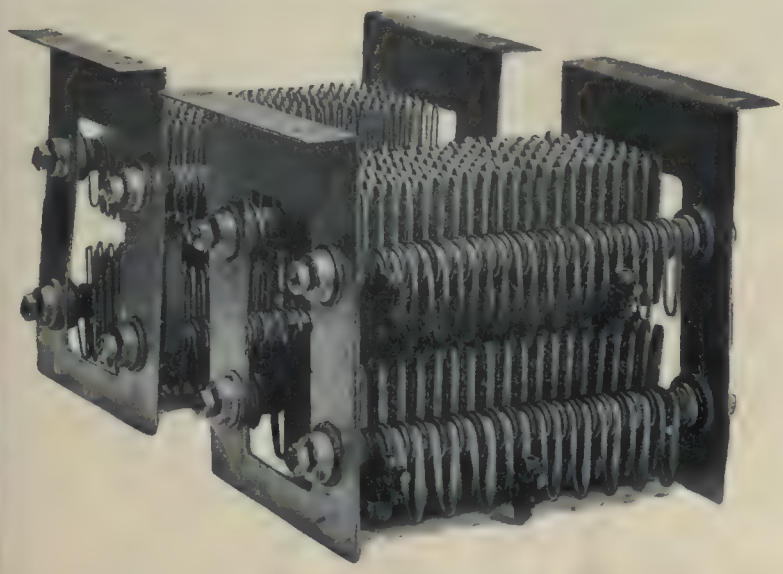

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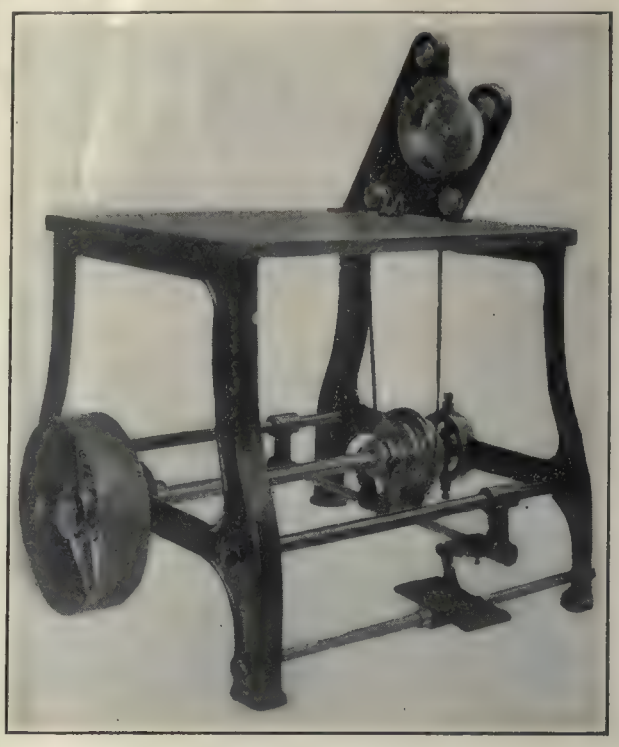

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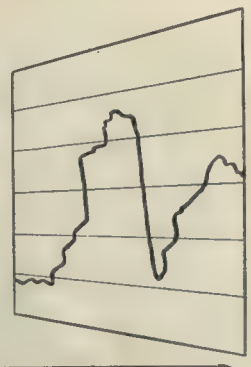
all the time



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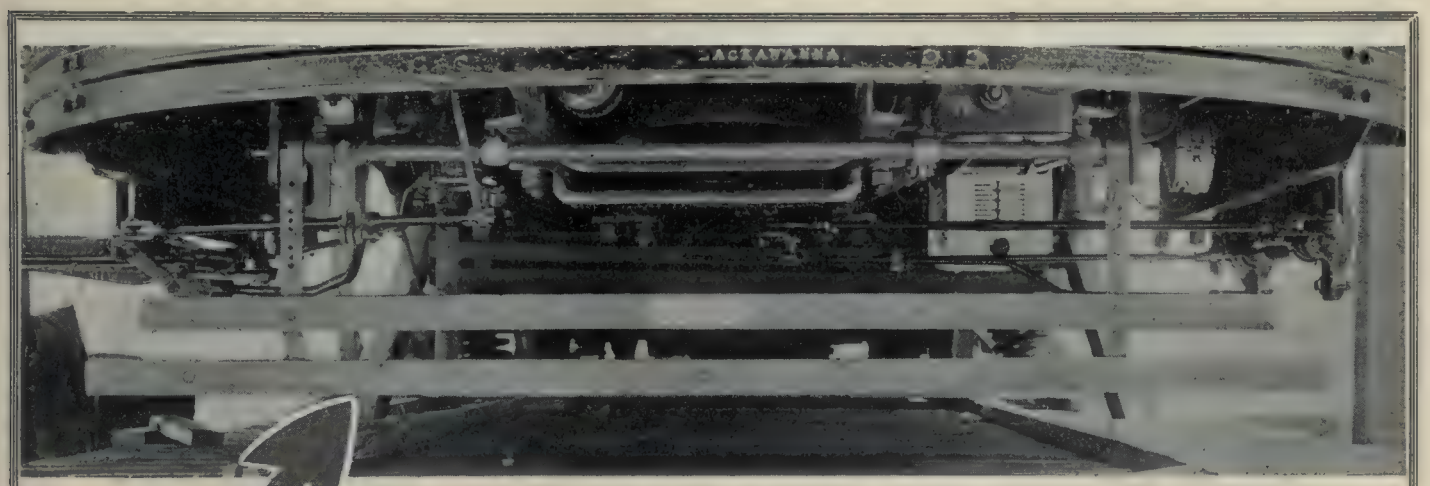

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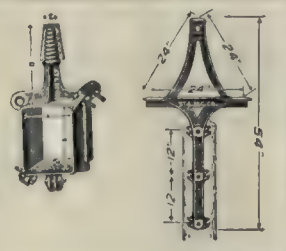

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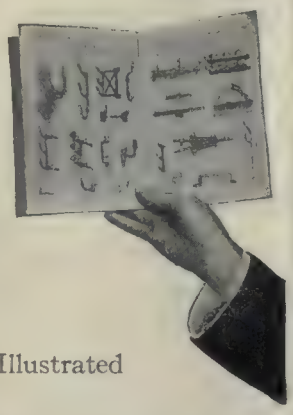

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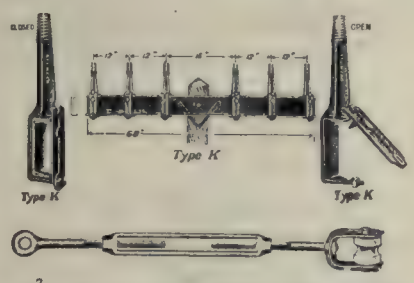

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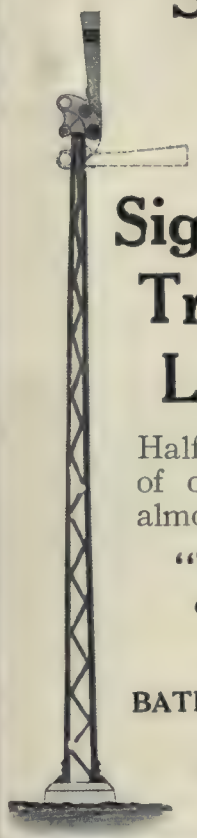

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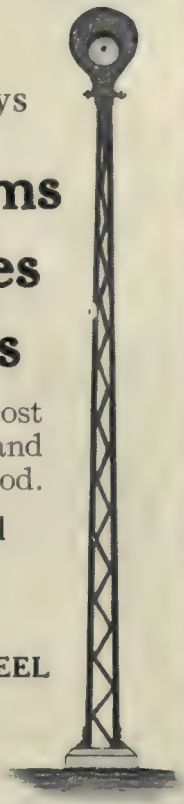

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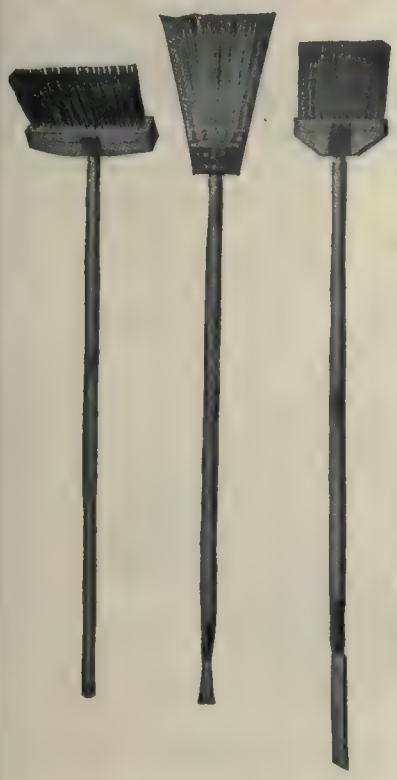

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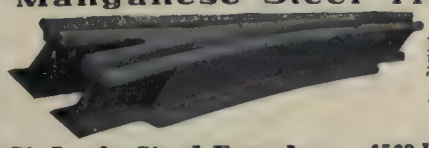

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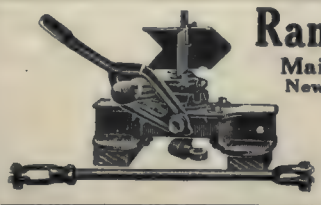

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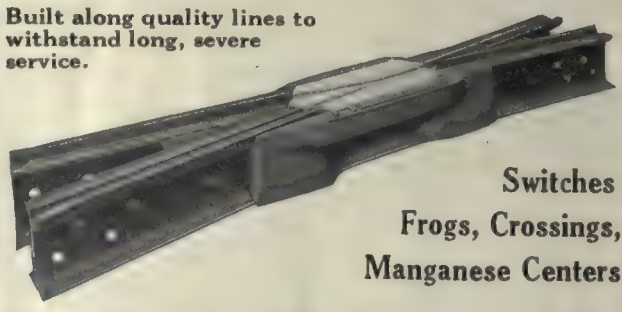

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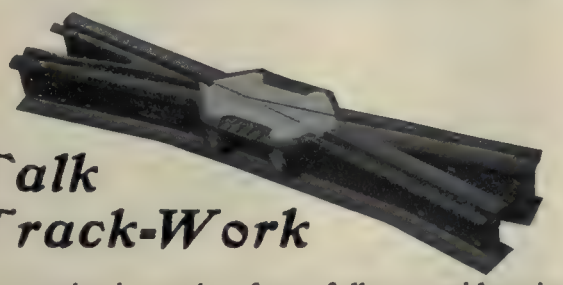

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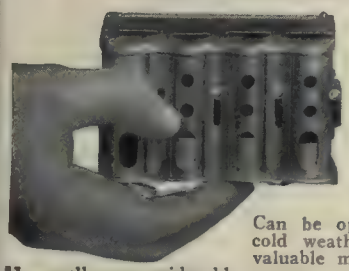

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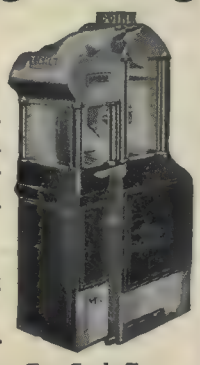

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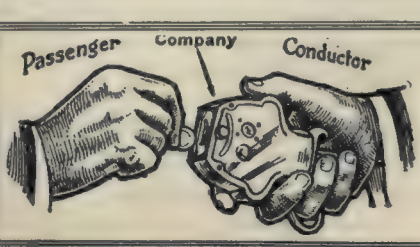

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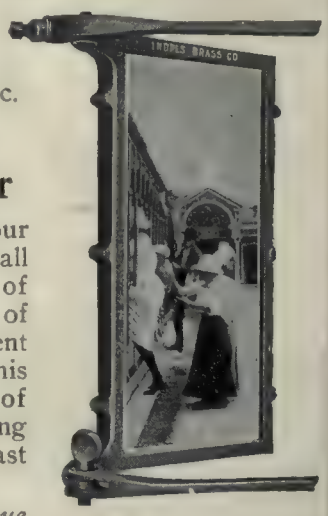

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Electric Railway Journal, 239 West 39th Street, New York

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Over 300 different products are here listed.

The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

Accountants.
Greims Corporation, H. E.

Acetylene Service.
Searchlight Co., The.

Advertising, Street Car.
Collier, Inc., Barron G.

Alloys, Steel and Iron.
Titanium Alloy Mfg. Co.

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Anchors, Guy.
Johns-Manville Co., H. W.
Western Electric Co.
Westinghouse Elec. & M. Co.

Architects.
Kennard, Ralph B.

Automobiles and Busses.
Brill Co., The J. G.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles.
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Carnegie Steel Co.
Cincinnati Car Co.
National Tube Co.
Niles Car & Mfg. Co.
St. Louis Car Co.
Standard Steel Works Co.
U. S. Metal & Mfg. Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
American General Eng'g Co.
Columbia M. W. & M. I. Co.

Badges and Buttons.
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Western Electric Co.

Bankers and Brokers.
Halsey & Co., N. W.

Batteries, Dry.
Johns-Manville Co., H. W.
Nungesser Carbon & Battery Co.
Western Electric Co.

Batteries, Storage.
Electric Storage Battery Co.
Esterline Co.
Western Electric Co.

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Baldwin Locomotive Works.

Bearings and Bearing Metals.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G
St. Louis Car Co.

Bearings, Roller and Ball.
Railway Roller Bearing Co.

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Brill Co., The J. G.
Electric Service Supplies Co.
Ohio Signal Co.
Reiter, G. C.
St. Louis Car Co.
Western Electric Co.

Benders, Rail.
Niles-Bement-Pond Co.

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co.
Johns-Manville Co., H. W.

Boiler Coverings.
Johns-Manville Co., H. W.

Boiler Graphite.
Dixon Crucible Co., Jos.

Boiler Tubes.
National Tube Co.

Boilers.
Babcock & Wilcox Co.

Bond Clips.
Electric Railway Improv. Co.

Bond Testers.
American Steel & Wire Co.

Bonding Tools.
American Steel & Wire Co.
Electric Railway Improv. Co.
Electric Service Supplies Co.

Bonds, Rail.
American Steel & Wire Co.
Electric Railway Improv. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Roebling's Sons Co., John A.
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McGraw-Hill Book Co., Inc.

Boring, Tools, Car Wheel.
Niles-Bement-Pond Co.

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Kilby Frog & Switch Co.

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Electric Service Supplies Co.
Lindsley Bros. Co.
Western Electric Co.

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Sauvage-Ward Brake Co.

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Long Co., E. G.
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Westinghouse Traction Brake Co.

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Calebaugh Self-Lubricating Carbon Co.
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Massachusetts Chemical Co.
Walpole Tire & Rubber Co.

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American Bridge Co.

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Diamond State Fibre Co.

Bushings, Rubber.
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Carbon Brushes. (See Brushes, Carbon.

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc., see those Headings.)

Car Trimmings. (For Curtains, Doors, Seats, etc., see those Headings.)

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American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Cincinnati Car Co.
Jewett Car Co.
Kuhlman Car Co., G. C.
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Columbia M. & W. & M. I. Co.
Falk Co.
Long Co., E. G.
St. Louis Car Co.
St. Louis Steel Fdry. Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.

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American B. S. & Fdry. Co.
American General Eng'g Co.
Long Co., E. G.
St. Louis Car Co.

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Eclipse Railway Supply Co.
Electric Service Supplies Co.
Long Co., E. G.
Wasson Eng'g & Supply Co.
Wood Co., C. N.

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Pantasote Co.

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Etter, Chas. F.
McGill Ticket Punch Co.

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Boyle & Co., Inc., John.

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Cutter Electrical & Mfg. Co.
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Klein & Sons, M.
Standard Railway Supply Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Cleaners and Scrapers, Track. (See also Snow-Plows, Sweepers and Brooms.)
Brill Co., The J. G.
Cincinnati Car Co.
Western Electric Co.

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General Electric Co.

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General Electric Co.

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Western Electric Co.

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Vacuum Impregnating Wks.

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Western Electric Co.
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Wood Co., Chas. N.

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Conduits, Underground.
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In mechanical and electrical workmanship the Weston Model 45 Portable Ammeters and Voltmeters practically attain perfection.

A full description will be found in Bulletin 501, which will be mailed to you on request.

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Samson Cordage Works.
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Boyle & Co., Inc., John.

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Wisch Service, P. Edward.

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Long Co., E. G.
Nuttall Co., R. D.

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Generators, Dir.-Current.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Gongs. (See Bells and Gongs.)

Gongs, Rotary Foot.
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Green Engrg. Co.

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Grinders, Portable, Electric.
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General Electric Co.
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Imperial Rubber Co.
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Massachusetts Chemical Co.
Sherwin-Williams Co.
Walpole Tire & Rubber Co.
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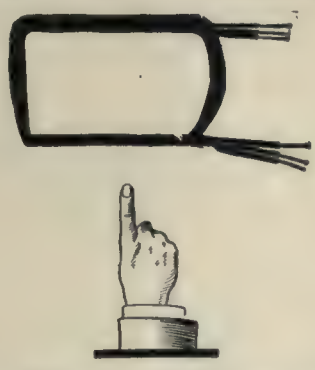

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Just a word will do about the wire itself. It's a pure lake copper, drawn accurately to gauge.

But it's the insulation we want to call your attention to. It's made of pure asbestos and a high temperature filler. The asbestos meets the demands of all over-load temperatures. The filler is a special impregnating compound which gives it the electrical insulating "backbone."

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Providence, R. I.

1

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All of these requirements are exceedingly well met in our No. 280 High Tension Cable and Field Tape. In the car motor, on the overhead and in the power-house, it has created demand for itself by its efficiency in service. Write for quotations.

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71680

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Non-renewable fuses are an expense. A good, renewable fuse is an investment.
The only good Renewable Fuse on the market is marked "Economy"

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IRCO FRICTION TAPES are the Standard

For Electric Railway and Lighting Use

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FOR CAR HOUSES

Compact, Durable, Easily and Speedily Operated and Fireproof. Openings of any size may be equipped and the doors motor-operated if desired. Manufactured by the

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There is a Sterling product best for every insulating purpose.

TRADE TODD PROCESSES MARK

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Pittsburgh, Pa.

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Western Electric Co.
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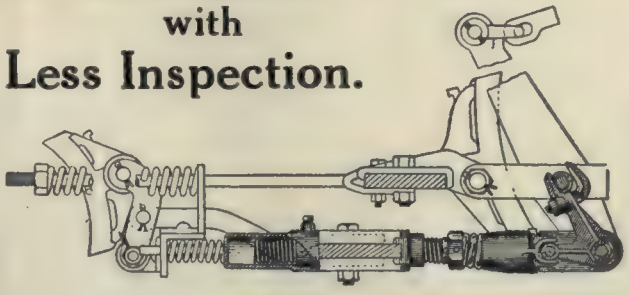

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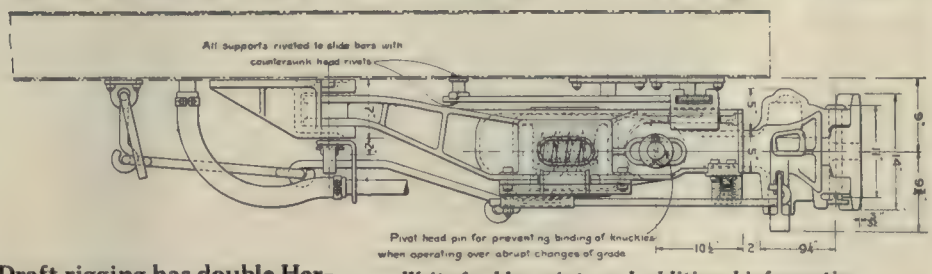

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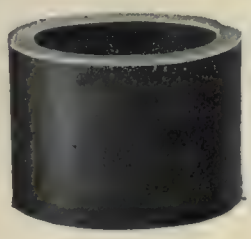

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Printing begins on Tuesday of each week.
Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.
New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.
If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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TITANIUM IN RAIL STEEL

No. 23

Influence on Segregation

A recent examination of data from reports on 155 heats of rail steel, of which about one-half were titanium-treated, showed that there was comparatively little difference between the carbon contents of the rail-head and of the web in the treated rails. In the untreated rails, however, no less than 64 per cent of the heats showed an excess of carbon in the web amounting to more than 12 per cent over that in the head. This difference of 12 per cent was suggested as a limit above which rails should be rejected on account of segregation, when applied to "A" rails or those taken from the heads of the ingots after a 9 per cent crop. With seventy-seven heats of titanium-treated rail it was found that 87 per cent would fall within the 12 per cent limit.

A more detailed examination of the seventy-seven heats in which titanium was used clearly showed the influence the amount of titanium added has on the results. The amount of Ferro Carbon Titanium usually recommended is 0.10 per cent. This, however, was not followed, as in some heats only 0.075 per cent was added and in some as little as 0.053 per cent. The following table shows the effect of the amount of titanium added:

Titanium added		—Heats within 12 per cent limit—	
Per cent	Total heats	Number	Per cent
0	78	28	36
0.053	7	3	43
0.077	39	33	84
0.10	31	31	100

This seems to show that in order to get the best results at least 0.10 per cent of metallic titanium should be added to the rail steel.

TITANIUM ALLOY MANUFACTURING COMPANY

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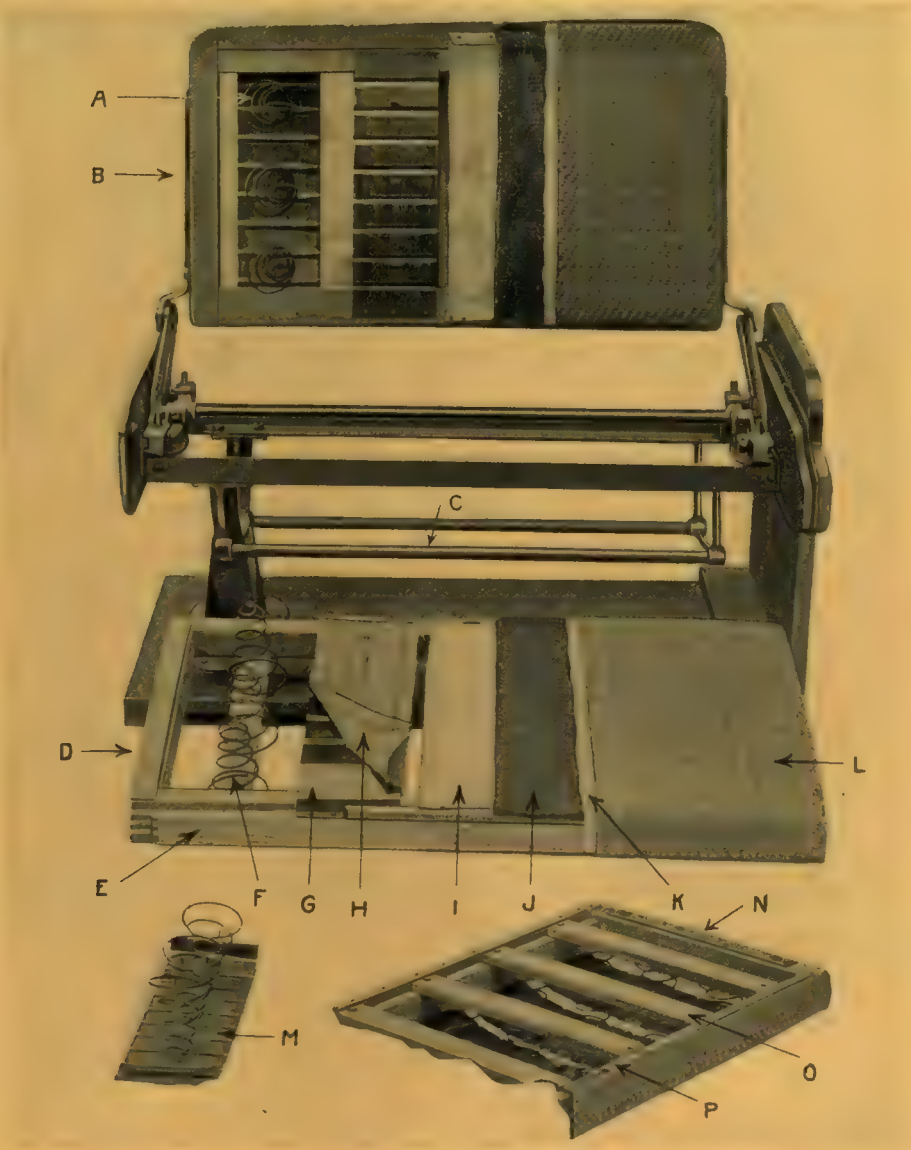
Electric Railway Department

Franklin, Pa.

3150

BRILL "WINNER" SEAT



Cushion and Back Construction

THE above photograph is from the Brill Car Parts Order Guide and shows a "Winner" Seat with the coverings of the cushion and back cut away to reveal the different layers and how they are applied. With the exception of the felt, canvas and webbing, every part that goes into the construction, including the twill-woven rattan, is made at the Brill Plant. Notice how securely the ash frames are dove-tailed together. The Brill "Winner" Seat is made for comfort as well as for rough usage and hard wear.

A Back Spring
B Back
C Foot Rest
D Cushion
E Cushion Frame
F Cushion Spring
G Corrugated Spring Plate
H Jute Webbing
I Canvas Interlining
J Felt
K Canvas Lining
L Woven Rattan Seating
M Corrugated Spring Plate
N Rocker Plate
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P Spline

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10,000 Kw. Curtis Turbine Metropolitan Street Railway, Kansas City, Mo.

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These features have demonstrated the superiority of the Curtis Turbine for street railway service, particularly where severe grades render the station load subject to considerable variation. The 10,000 Kw. turbine pictured above, the most recent addition to the generating equipment of the Metropolitan Street Railway of Kansas City, is a typical Curtis Turbine operating under these conditions, and satisfying the demand for high economy and uninterrupted service.

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5563

ELECTRIC RAILWAY JOURNAL

Volume 45
Number 25
June 19, 1915

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East Pittsburgh, Pa.

Electric Railway Journal

New York, June 19, 1915

Volume XLV No. 25 Pages 1141 to 1188

Contents

Michigan Railway's 2400-Volt Third-Rail Line 1144

This 94-mile road, the first of its kind to be built, has just been placed in operation, being designed for speeds up to 90 m.p.h. The project, which was conceived by the late W. A. Foote, includes a 44-mile section of electrified steam line.

ELECTRIC RAILWAY JOURNAL, June 19, 1915. 11¼ cols. Ill.

Central Electric Railway Accountants 1151

Report of meeting held in Indianapolis on June 11 and 12. Abstract of paper on the relation of the accounting and mechanical departments.

ELECTRIC RAILWAY JOURNAL, June 19, 1915. 7 cols.

C. E. R. A. Meeting 1156

Abstracts of papers on track joining and bonding, the human element in electric railway operation and engineers and public service.

ELECTRIC RAILWAY JOURNAL, June 19, 1915. 8 cols.

Organizing the Traffic Survey 1161

F. W. Doolittle, director bureau of fare research, discusses the type of men, organization and supervision to be employed in traffic surveys. Work mapped out for large, medium and small companies.

ELECTRIC RAILWAY JOURNAL, June 19, 1915. 4½ cols.

Master Car Builders' Convention 1163

At the annual meeting at Atlantic City, June 14-16, car construction, draft equipment, brakeshoes, impacts between moving cars and couplers were among the subjects discussed.

ELECTRIC RAILWAY JOURNAL, June 19, 1915. 4½ cols.

Chicago's Two-Day Strike 1165

Mayor Thompson's efforts for arbitration succeed, despite stolid refusal of men at first to accept arbitration as a means of adjusting wage-scale differences.

ELECTRIC RAILWAY JOURNAL, June 19, 1915. 8 cols. Ill.

Equipment and Its Maintenance 1169

Los Angeles Illuminated End Destination Sign with Car and Run Numbers—*By E. L. Stephens.* Track Tools—Supplies and Appliances—*By R. C. Cram.* Increasing the Output of Hydraulic Presses—*By "Vulcan."* A Simple Ventilating Scheme for Increasing Motor Output—*Ly R. H. Parsons.* A Steel Underframe, Open-Bench Car. Electrification of the Great Falls Terminal of the C., M. & St. P. Railway. New Forms of Fare Indicators and Recorders. Temporary Drilling Outfit for Toe Plates. Trade-Marked Waste. Corrosion Test of Sheet Steel. An Inexpensive Wheel Grinder. A New Third-Rail Insulator.

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FRICTION

(Its relation to efficient brake control of moving trains)

FRICTION IS A RETARDING FORCE IN SOCIETY, POLITICS, BUSINESS AND RELIGION.

BUT FRICTION REPRESENTS A CURIOUS PARADOX IN THE VARIOUS FIELDS OF ENGINEERING AND MECHANICS. IT IS AT ONCE ESSENTIAL TO EFFICIENCY AND OPPOSED TO IT. PRACTICALLY ALL APPLICATIONS OF POWER DEPEND FINALLY UPON FRICTION; ALSO ALL POWER APPLICATIONS ARE SUBJECT TO SERIOUS LOSSES DUE TO FRICTION.

A RAILROAD TRAIN IS PECULIAR IN THAT WHILE ACCELERATION—THE HAULING CAPACITY OR TRACTIVE EFFORT OF THE LOCOMOTIVE—DEPENDS FUNDAMENTALLY UPON FRICTION—(WHEEL—RAIL); DECELERATION—BRAKE CONTROL OF ALL TRAIN MOVEMENT—ALSO DEPENDS FUNDAMENTALLY UPON FRICTION (WHEEL—SHOE).

ON THE ONE HAND WE HAVE HEAVY TRAINS AT HIGH SPEEDS REPRESENTING UNBELIEVABLE TOTALS OF FOOT TONS OF ENERGY; ON THE OTHER HAND WE HAVE, TO CONTROL THIS MOVING MASS, THE FRICTION OF A FEW SQUARE INCHES OF BRAKE SHOE IN CONTACT WITH A ROTATING WHEEL.

BRAKE SHOE FRICTION AND TRAIN RETARDATION RESULTING THEREFROM VARY WITH LEVERAGE, PRESSURE, TEMPERATURE, DURATION OF CONTACT, LOCATION OF BRAKE SHOE ON WHEEL, BRAKE MECHANISM DESIGN INVOLVING ABILITY TO ALTERNATE AND GRADUATE BRAKING POWER ON THE TRAIN, AND A HUNDRED OTHER FACTORS WHICH ENTER INTO THIS MOST COMPLEX AND INVOLVED BRANCH OF AIR BRAKE ENGINEERING.

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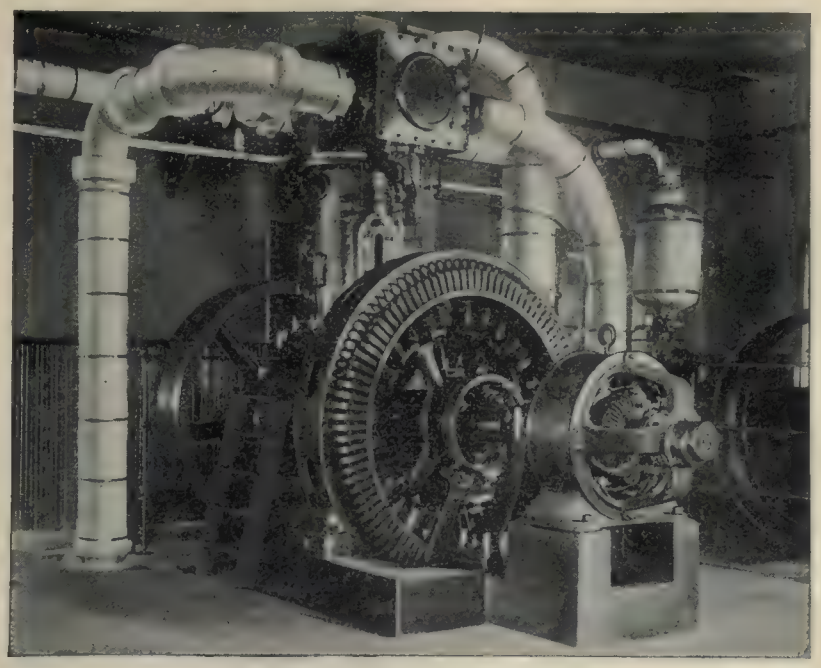

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A line of alternating-current generators for direct connection to steam, gas or oil engines, or horizontal water wheels.

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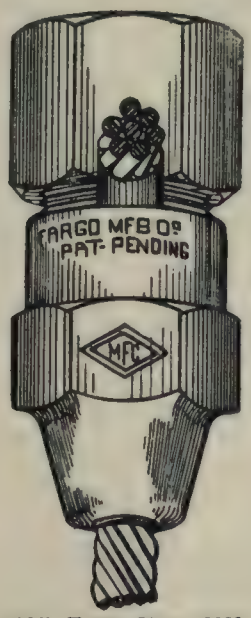

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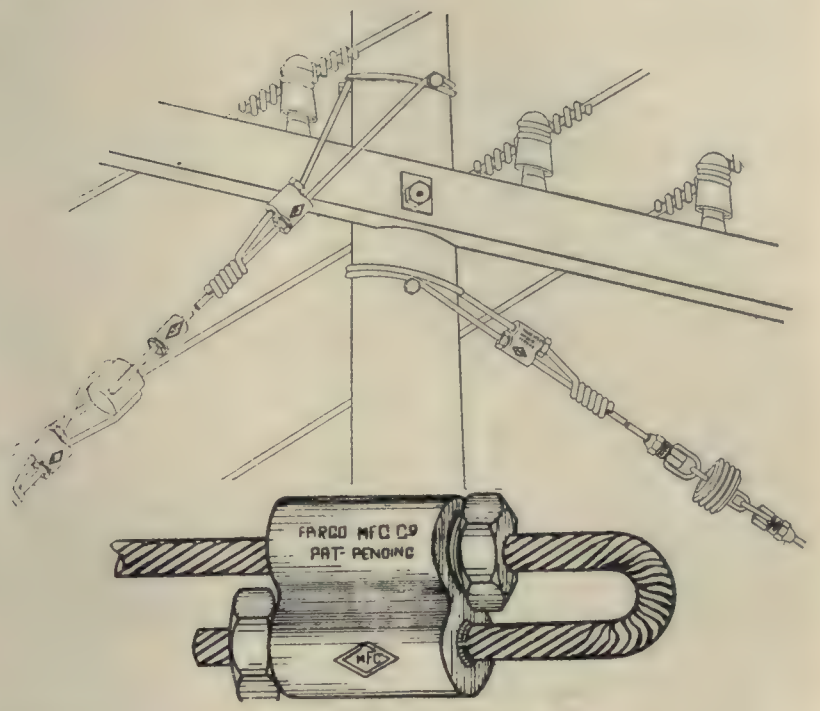

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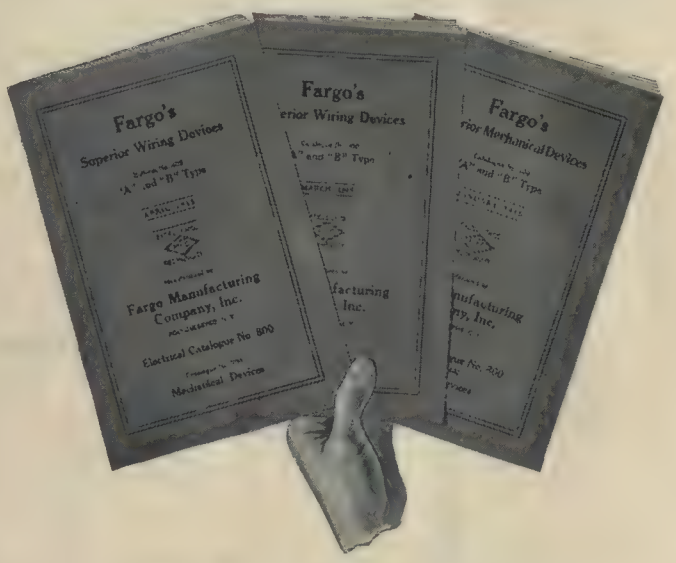

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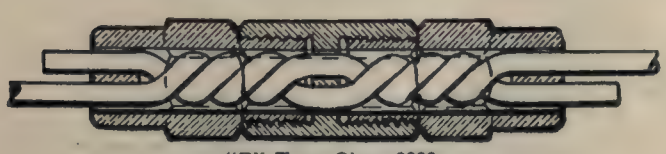

"B" Type Class 9000
The F. M. C. Wire Connector

The Convention at San Francisco

of the American Electric Railway Association

and affiliated organizations October 4 to 8, will, as in past years, be fittingly marked by the

Electric Railway Journal Annual Convention Number

To be issued September 18

Plans are in hand for making this year's issue even more than usually valuable and interesting to the industry.

The Association will, this year, provide no exhibit facilities for manufacturers. Therefore, the advertising pages of the Journal's Convention Number will take the place of the usual Convention exhibit space. Make your plans early.

Unless you have an exhibit at the Panama-Pacific Exposition, this will be your one opportunity to bring your products forcefully to the attention of Convention delegates and visitors, as well as to those railway men who do not attend the Convention.

If you have an exhibit at the Exposition, use the Annual Convention Number to feature it.

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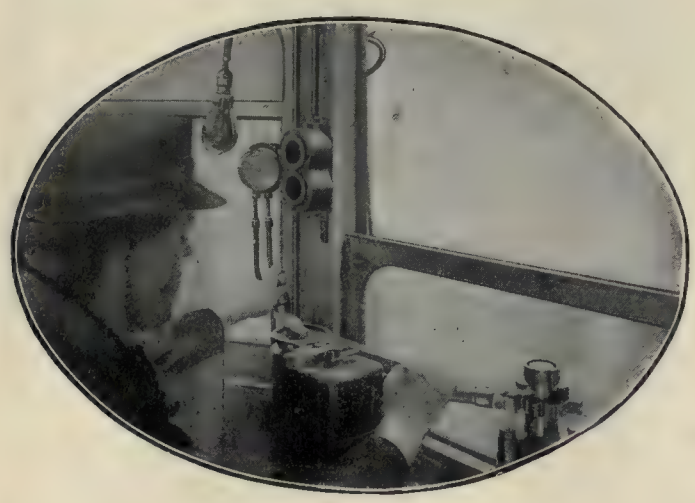
The Equipment & Engineering Company
2 and 3 Norfolk St., Strand, W. C., London, England

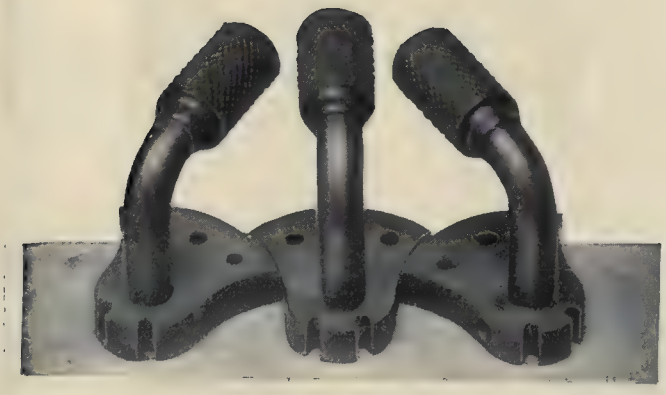
THE SIMMEN SYSTEM

←Location of Trains Automatically Displayed Direct to Dispatcher



←Continuous Display of Signals in Motorman's Cab

←Direct Communication from Dispatcher to Motorman



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Simmen Automatic Railway Signal Co.

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The Old Way

The New Way

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These signals are used to protect about a mile of single track, with a turn-out about half way, over which two different railways operate a line of cars, each road using the turn-out as a meeting-point.

Under old conditions when one line would run late it would naturally delay the other line, but under the present conditions these delays have been done away with.

In December, 1914, 2 sets of the United States Automatic Electric Signals were installed on this line and have been operating successfully up to the present.

Yours respectfully,
Chas. Finigan, Line Foreman

Westchester Electric
Railroad Company

And they will do the same for you. Why don't you ask us about "Signals Without an Appropriation"?

United States Electric Signal Company

West Newton, Massachusetts

Foreign Representatives

Quilliam Brothers, Cleggs Court, Chapel Street, Salford, England

U.S. ELECTRIC SIGNAL CO. WEST NEWTON, MASS.

3165

Consider These Facts

It is a common condition for International Steel Foundations for Grade Crossings

to show after long service:

—Not a bolt loosened;

—Not a particle of wear on the steel longitudinals which carry the rails at the crossing;

—Not a clip sheared;

—Not an inch of creeping;

—And the crossing itself in almost the same condition as when it went in.

The savings this represents can be savings effected on *Your* road. Nor do you need skilled labor to put down the Steel Foundations.

International Steel Foundations for Grade Crossings, as well as International Twin Steel Ties for paved streets mean least expensive and the most modernized track construction.

Be convinced by writing for the data and the large list of users.

International Steel Tie Co.

General Sales Office and Works: Cleveland, Ohio

Parrott & Company, San Francisco, Cal. Los Angeles, Cal.

Western Eng'g Sales Co., Seattle, Wash. Portland, Ore.

R. J. Cooper Co., Salt Lake City, Utah

J. E. Lewis & Co., Dallas, Texas

Maurice Joy, Philadelphia

William H. Ziegler, Minneapolis, Minn.

Weedless Tracks

The Easiest Way and The Cheapest Way

The Day of Application

Applying with Atlas "A" Sprinkling Equipment

The Atlas "A" Method

161 Days after Application

It weeds your tracks with a thoroughness which is almost unbelievable to those who have used manual labor for weed extermination. The work is done with rapidity and requires only a minimum of Atlas "A." The weeds are killed above ground and below. Their seeds are destroyed. Atlas "A" gets the entire vegetable growth. It leaves no life.

When we assume supervision of the work, we get the utmost economy. The spraying is done with uniformity.

And speaking of uniformity, it is important here to say that the track job is done uniformly well—not in patches.

The economy, for one thing, consists in the fact that three men with Atlas "A" Equipment will do about as much work as 400 men weeding by hand.

All we need is your motive power. We take care of the rest.

Send the Coupon for Booklet —Today.

Please send me a copy of your Booklet, "Eliminating Track Vegetation."

Name.....

.....

Official Position.....

Firm Name.....

Firm Address.....

2522

Atlas Preservative Company of America
(Inc.)

95-97 Liberty St., New York

Here Are Some Articles of Proven Merit

Keystone Lamp Guards

are **the** guards for service, for service in car barns, engine rooms, repair shops, locomotive and car pits, mines, tunnels, subways—in short, wherever a **strong, durable** lamp guard is required.

Cages are of Bessemer steel wire, with rings and ribs electrically spot welded together; fittings are of malleable iron; the whole cage is carefully tinned. Sockets are well designed and rigidly held in place in hard maple handle.

Furnished in 16 and 32 c.p. sizes, every guard being insulated for 600 volts.

Profit by using Keystone Guards. Sample?

Keystone Cord Connectors

The best little time and money savers on the market. They connect all kinds of cord, either cotton or leather, and are particularly adapted for connecting either broken or new signal, bell or register cord. The finished joint is smooth and will travel through pulleys and guides as readily as the continuous cord.

They hold because they are provided on the inside with **square-edged ribs** that **bite** into the cord; they are easy to apply because they are split in the middle.

Why not profit by using these also? Samples?

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Sts.

NEW YORK
Hudson Terminal

CHICAGO
417 So. Dearborn St.

Meter Results on Chicago & Milwaukee Line

Economies Effected by Ampere-Hour Meters on This High-Speed Interurban Railway Produce a Net Return at the Rate of $12,000 Per Annum, the Necessary Investment Amounting Only to One-Fifth of This Amount

Probably one of the first complete in[illegible]ns of car meters on an electric system in this coun[illegible] that made on the cars of the Chicago & Milwaukee Electric Railroad, Highwood, Ill. During the last few years the possibilities and limitations of the car meter have attracted the serious attention of electri[illegible] probably to a greater extent than [illegible] increased operating exp[illegible] omies in all d[illegible] men[illegible]

ing Type M control, necessitated considerable extra wiring and labor. The diagram on this page, which [illegible]ws the meter [illegible] for the interurban ca[illegible] installation, while [illegible] a representa-

ECONOMY
BUILT LIKE A WATCH
METERS

reduced power expenses

The call for **economy** in energy consumption was answered on the Chicago & Milwaukee Electric Railroad by **Economy Meters.**

A five dollar saving for every dollar invested in Economy Meters indicates the fullness of that answer.

Read again how this substantial saving was made. Review the four-page illustrated article in this Journal for May 22nd. It pointed out the energy-saving, the equipment-saving, the maintenance-saving, the schedule improvement and the high average voltage which the use of the meters made possible.

The manager, engineer, superintendent or trainman seeking ways and means to improve man-efficiency, operating-efficiency and equipment-efficiency can well afford to investigate—to learn what other city and interurban roads have gained by the use of Sangamo Economy Meters.

Let us mail interesting engineering and transportation data and a reprint of the article which appeared in May 22nd issue of Electric Railway Journal.

Sangamo Electric Company
Springfield, Illinois

[illegible] cars [illegible] operation, and [illegible] were made. In fact, [illegible] given for the most part verbally [illegible] accompanied by constant disciplining of careless and indifferent motormen. Therefore, the savings described should be considered as an average, rather than as the maximum possible economy which may be effected under similar conditions on other roads.

The installation was completed Jan. 3, 1915, at a cost of $4.06 per car, exclusive of the cost of the meters. This may appear high but was due to the fact that all cars were double-ended, and the interurban cars, hav-

[illegible] upon [illegible] rules instilled [illegible] set to work to reduce the [illegible] consumption. The management, believ[illegible] experience was the best teacher, permitted the men [illegible] satisfy themselves as to the correctness of the rules [illegible] and immediately they began experimenting.

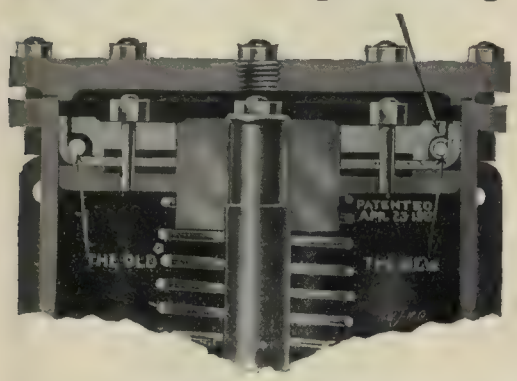
The interest taken in the meters and the pride the men took in their records were remarkable. Of course, there is always a small percentage of the men that take no interest in improvements, and this percentage was not lacking among the Chicago & Milwaukee trainmen. Certain men, upon finding that the meters ran slower on series points than on the others, tried to run on series as much as possible, but after reading the meter at the end of the run found they were in error. Others, believing that more rapid acceleration meant lower energy consumption, tried accelerating their cars too

JOHNS-MANVILLE SERVICE TO THE ELECTRICAL INDUSTRY

IF an expert technical man—a close friend in whose opinion you had the greatest confidence—were to tell you that a certain product was "sure to give the kind of service you're looking for," you'd believe him and follow his advice.

J-M Products have been recommended in so many instances by such men that they have become the standard, not only because they are the highest grade of material, but because they represent the effort of 50 years' experience in the field and are backed by Johns-Manville Service and Responsibility in the marketing.

Air brake packing lasts 3 times as long when you use J-M Expander Rings in the cylinders



A glance at the illustration will show how the special cross section of the J-M Expander Ring distributes the wear on the leather packing. In other words, the cutting action that is produced by the round packing ring is entirely eliminated.

This fact is important in view of the expense incurred each time a car is "shopped" for air brake repairs—and also by reason of the saving in leathers.

The price of the ring is inconsequential as compared to the saving it effects.

These rings are a part of the standard air brake equipment of many of America's most progressive roads. Why not try them out? Nearest J-M Branch will gladly quote on your requirements.

A 2 ½" Giant Strain Insulator—Breaking Strain 8000 lbs. One of the many J-M Line Materials

This line of strain insulators, which embraces all eyelet, clevis and combination terminals, is a good example of the efficiency of all J-M Line Materials from a standpoint of electrical resistance and mechanical strength.

The metal parts of all J-M Line Materials, whether castings or forgings, are built with large factors of safety and built to withstand uncommon stresses due to exceptional conditions arising in service.

All insulating compounds are positively weatherproof and thus maintain their structure without deterioration for years. This fact is attested by the performance of these materials during the years that they have been in constant use, and still in perfect condition.

Let us acquaint you with the complete line. The J-M branch nearest you has all the literature and prices.

H. W. JOHNS-MANVILLE CO.

Akron, Albany, Atlanta, Baltimore, Birmingham, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Columbus, Dallas, Dayton, Denver, Detroit, Duluth, Galveston, Houghton, Houston, Indianapolis, Kansas City, Los Angeles, Louisville, Memphis, Milwaukee, Minneapolis, Newark, New Orleans, New York, Omaha, Philadelphia, Pittsburgh, Portland, Rochester, St. Louis, St. Paul, Salt Lake City, San Francisco, Seattle, Syracuse, Toledo, Washington, Wilkes-Barre, Youngstown

THE CANADIAN H. W. JOHNS-MANVILLE CO., LIMITED, Toronto, Montreal, Winnipeg, Vancouver

3203A-3230

Here's the Biggest "Little" Thing on a car

Small in size — but big in influence upon car operation.

Insignificant in cost itself—but controlling many of the principal factors in the cost sheet.

Therefore, when you consider what efficiency in trolley equipment really means, you'll realize why you ought to use the

V-K

OILLESS TROLLEY WHEEL
and
NON-ARCING HARP

THIS trolley wheel has only one cost attached—the first. It will run until worn out without attention or the expense of lubrication. The bushing of the V-K OILLESS WHEEL is impregnated with graphite, which supplies thorough lubrication to the bearing in any temperature. It won't run hot or burn out. The wheel metal is tough—not hard—uniformly well balanced, which eliminates arcing and increases life of all overhead.

The harp is just as important as the trolley wheel—if not more so. The V-K NON-ARCING HARP will outlast any other design, while giving continuously better service. Its patented gripping device locks and holds the axle pin firmly in place, preventing wear on the pin-hole and arcing between pin and harp. Thus the wheel is given a properly rigid bearing always, and the passage of current through wheel and bearing into the harp metal is greatly facilitated. Pins and wheel can be easily and quickly changed at any time.

Don't Overlook

this big "little" thing and what V-K equipment can do. Test our claims for yourself. You'll be sending us a full order after you once try out the V-K combination.

Send for our new illustrated catalog. It contains full information on sizes, styles, etc., covering our whole line of wheels and harps.

More-Jones Brass & Metal Co.

St. Louis, Mo.

Manufacturers of Trolley Wheels and Harps, Contact Springs, Motor Axle Bearings, Armature Bearings, Truck Journal Bearings, Air Compressor Bearings, Armature Babbitt Metal and similar products.

PREST-O-LITE

Dissolved Acetylene

(Ready-made Carbide Gas)

Enables you to use the same outfit for both track and shop Oxy-Acetylene welding and cutting work

Applying copper bonds to rails by the oxy-acetylene process

Tremendous Savings Open to You

Prest-O-Lite puts this money and time-saving process in your reach. Not only in the repair of broken or worn equipment, but in construction work, oxy-acetylene welding equipment soon pays for itself. Prest-O-Lite Dissolved Acetylene makes it doubly efficient.

We are prepared to show by records of actual work, or demonstration on your track, that oxy-acetylene welded bonds "stand up" better, have more lasting electrical efficiency and that they cost less and last longer than any other type. Prest-O-Lite equipment requires no train crew—does not tie up the line and can be operated *day or night.*

The same outfit can be used in the shop for making "on the spot" repairs that often save more in time and money than the cost of several Prest-O-Lite welding outfits. Progressive electric railway systems are saving thousands of dollars every year, by being able to put back into service, equipment made good as new that could be repaired by no other method, and replaced only by an expenditure of time and money many times over that required for the simple, efficient oxy-acetylene welding repair.

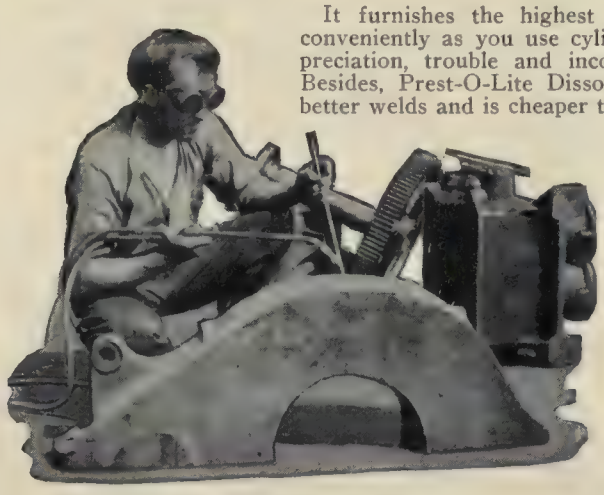
Simple Apparatus—Easy to use

The cost of good welding equipment is low. We furnish a thoroughly high grade welding apparatus for $60, not including acetylene cylinders, which are extra and are furnished under a liberal service plan. Truck and special equipment for cutting operations at extra cost.

This equipment requires no attention, when not in actual use. Any mechanic can learn to become a proficient operator. We furnish thorough directions with every outfit—or will train your operator in our welding schools.

Prest-O-Lite Acetylene Service is Permanent and Universal

It furnishes the highest grade of Dissolved Acetylene in portable cylinders, used as conveniently as you use cylinders of oxygen. Saves the large initial outlay and heavy depreciation, trouble and inconvenience of making crude Acetylene in carbide generators. Besides, Prest-O-Lite Dissolved Acetylene is perfectly dried, cleaned and purified—makes better welds and is cheaper to use.



Patch being welded on gear housing

Send for Data that will help you make greater savings

The electric railway field is full of wonderful opportunities to use oxy-acetylene welding to wonderful advantage. New uses are being found daily.

We have prepared Bulletins on some of the most important phases. These are free. Send for them.

The Prest-O-Lite Company, Inc.

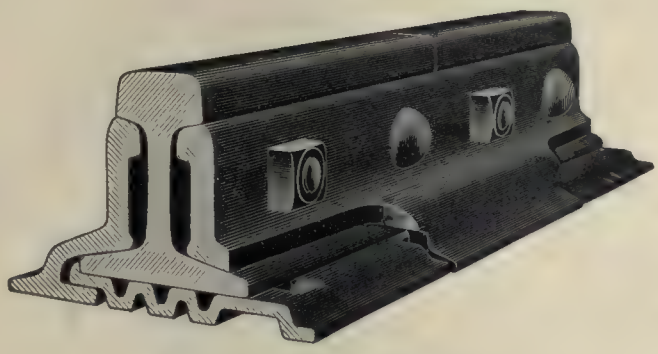
The World's Largest Makers of Dissolved Acetylene

805 Speedway **Indianapolis, Ind.**

53 direct factory branches and charging plants in principal industrial centers

The Rail Joint Company
185 Madison Avenue
New York

ROLLED FROM BEST QUALITY STEEL



WOLHAUPTER RAIL JOINT

AGENCIES

Boston, Mass.....India Bldg.
Chicago, Ill. Railway Exchange Bldg.
Denver, Colo.....Equitable Bldg.
Philadelphia, Pa. Pennsylvania Bldg.
Pittsburgh, Pa.....Oliver Bldg.
Portland, Ore.....Wilcox Bldg.
St. Louis, Mo.,
Commonwealth Trust Bldg.
Troy, N. Y.....Burden Avenue

Montreal, Can. Board of Trade Bldg.

London, E. C., Eng.,
36 New Broad St.

Makers also of CONTINUOUS, WEBER and ONE HUNDRED PER CENT. RAIL JOINTS for Standard, Girder and Special Rail Sections. Also Joints for Frogs and Switches; Insulated Rail Joints and Step or Compromise Rail Joints

PATENTED IN UNITED STATES AND CANADA 3

Clamping Molds in Position in Making up Thermit Compromise Joints

Let Us Give You Details of How 3 Men Can Make 6 Compromise Joints in 10 Hours

We have an inexpensive outfit that will enable you to make your own compromise joints at a great deal lower cost than the mechanical or cast joint, and make them in a jiffy; in fact, over night.

The Thermit fully welded compromise joint will give perfect electrical conductivity and stand up under the most severe traffic.

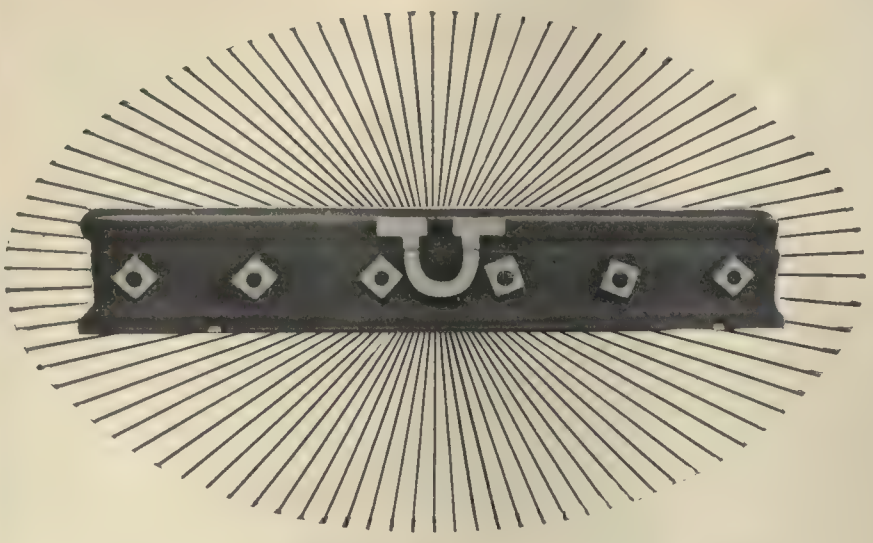
You can end your compromise joint troubles by installing a Thermit Outfit for this work.

In the event of your ordering an outfit, we will be pleased to have one of our representatives call and give the necessary instructions.

Full information is given in our pamphlet No. 3932.

GOLDSCHMIDT THERMIT CO.

WILLIAM C. CUNTZ, General Manager
90 WEST STREET, NEW YORK
329-333 Folsom St., San Francisco 103 Richmond St., W., Toronto, Ont.
7300 So. Chicago Ave., Chicago



The Electric Railway Improvement Co
Cleveland, Ohio

There is a bond, electrically welded to the rail. It simply cannot come loose or corrode—and what is directly to the point, the shape gives security against destruction by vibration.

YOUR Side of the Fence says

in Opinion No. 11:

Engineer
Maintenance of way
160 Miles Track

"I consider the Reciprocating Grinders an essential part of our company's track department equipment. But for the use of these machines our Company would have been required to completely remove rails which have been in service only two years. They entirely eliminate rail corrugations at a very moderate cost considering the advantages gained."

The extension of rail-life which the Reciprocating Grinder secures virtually reduces the final cost of the grinder to a trifling figure. As to the cost of grinder operation, this engineer's views give the facts.

Railway Track-work Co., Philadelphia

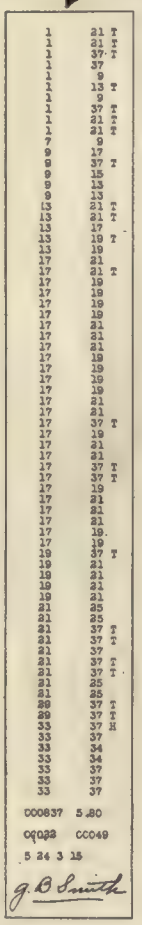
COLLIER SERVICE
YOU
are cordially
INVITED
to INSPECT
our
NEW
CENTRAL
PLANT
CANDLER
BUILDING
220 W. 42nd. St.
NEW YORK CITY
CAR
ADVERTISING
ALMOST
EVERYWHERE
Barron G. Collier
INCORPORATED

The Statistics of a Bonham Traffic Recorder

Are Always Complete

Here is a typical train report

And here is what it told:



Division 5, Train No. 24, Cond. G. B. Smith. March 15.

Station No.	Station Name	Passengers On Cash	Passengers On Ticket	Passengers Off
1	Anderson	3	7	..
7	Country Stop	1	.	.
9	Alexandria	4	1	3
13	Summitville	2	3	3
15	Country Stop	..	.	1
17	Fairmont	23	4	2
19	Jonesboro	4	1	14
21	Marion	5	4	22
25	Country Stop	..	.	4
29	LaFontaine	..	2	..
33	Treaty	7	..	..
34	Country Stop	..	..	2
37	Wabash	..	..	20
	Total	49	22	71

Cash Fares	49	
Ticket Fares	22	
Total Passengers		71
Amount Cash Fares	$5.80	
Amount Ticket Fares	9.40	
Train Earnings		$15.20
Passenger Miles		837
Earnings per Passenger Mile		.018
Miles per Passenger		11.8
Through Passengers		3
Passengers from:		
Town to Town		63
Town to Country		7
Country to Town		1
Country to Country		0

Page eight

The Company, in the slip of paper which the Recorder gave it, secured all the necessary data of the run. And the Recorder always loomed large before the passengers as each fare was "rung up."

Get the new Catalog. It will prove profitable to you.

The Bonham Recorder Co.
Hamilton, Ohio

2555

The rapidity with which wire can be fished means a saving in labor as well as uninjured wire insulation. Experience has proved that to you, we know.

In order to obtain smoothness and speed in wire-handling

DURADUCT

Reg. U. S. Pat. Off.

Flexible—Non-Metallic Conduit

has a special "roller-bearing" surface, eliminating 75% of the friction.

There is another big factor in Duraduct efficiency—the single wall. There is no blistering or rending under use.

You must also consider Duraduct light weight and flexibility as compared with iron pipe.

Every comparison favors Duraduct. You can make the comparison for yourself if you wish. There is a sample here awaiting your call.

Duraduct will apply to every conduit use around a power plant, car house, or repair shop.

"Duraduct for Durability"

Tubular Woven Fabric Co., Mfrs. Pawtucket, R. I.
A. HALL BERRY, General Sales Agent
97 Warren St., New York **9 So. Clinton St., Chicago**
Distributors for Canada
Northern Electric Company, Ltd.

The most powerful railway headlight

The high candle-power light source made possible by the new gas filled incandescent lamp, together with the scientifically designed light-directing equipment, makes the J-11 the most powerful headlight for electric railway service.

This headlight illuminates the track from 1500 to 1800 feet ahead of the car and is indispensable to "Safety First" for high speed interurban traffic.

An intense and constant beam is always assured by the focussing mechanism which is built in the headlight. This simple mechanism permits the adjustment of the lamp bulb, in any direction to the exact focal point of the reflector.

This J-11 incandescent headlight can be used interchangeably with existing 4-ampere arc headlights, as the wiring, switches, resistance, etc., do not require alteration. Its price is low.

Any incandescent lamp in a G-40 bulb or smaller may be used, but the 80-volt 4-ampere MAZDA C Lamp will give the greatest illumination and most satisfactory results.

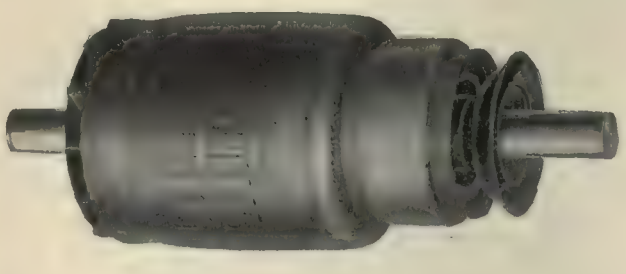
There is a G-E Headlight for every car in the system, no matter how intricate your service conditions may be.

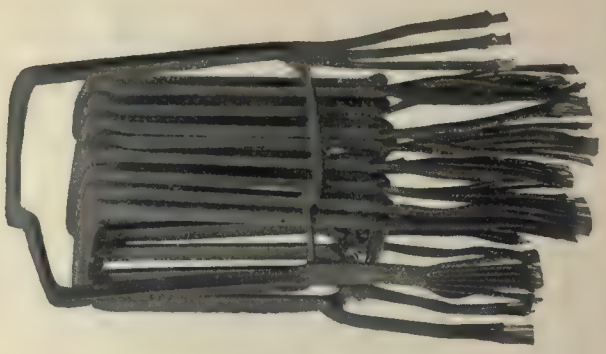
General Electric Company

General Office: Schenectady, N. Y.

List of sales offices on back cover of this magazine

5517





Keep Spare Armatures on Hand

Spare G-E armatures will keep your cars in service, saving many an hour in replacing burnt-out armatures. The spare armature is to the trolley car what a spare tire is to the motorist. Twenty minutes at the barn will suffice for inserting a new armature—and the old one can be rewound at leisure.

G-E Armature Coils Are Easy to Install

In repairing the old armature have a few G-E armature coils ready to slip in. G-E armature coils for G-E motors mean a great saving of time in replacing burned-out coils. They insure an absolute fit, eliminating forcing coils into the slots and later shrinkage and vibration in service. They are made of the best materials, carefully selected and wound and insulated with the utmost skill by expert workmen.

Put G-E Armatures and Armature Coils on your next order.

General Electric Company

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
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Buffalo, N. Y.
Butte, Mont.
Charleston, W. Va.
Charlotte, N. C.
Chattanooga, Tenn.
Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio
Columbus, Ohio
Dayton, Ohio
Denver, Colo.
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General Office: Schenectady, N. Y.

ADDRESS NEAREST OFFICE

Jacksonville, Fla.
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Knoxville, Tenn.
Los Angeles, Cal.
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Nashville, Tenn.
New Haven, Conn.
New Orleans, La.
New York, N. Y.
Niagara Falls, N. Y.
Omaha, Neb.
Philadelphia, Pa.
Pittsburg, Pa.
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Toledo, Ohio
Washington, D. C.
Youngstown, Ohio

For Michigan business refer to General Electric Company of Michigan, Detroit, Mich.
For Texas, Oklahoma and Arizona business refer to Southwest General Electric Company (formerly Hobson Electric Co.), Dallas, El Paso, Houston and Oklahoma City. For Canadian business refer to Canadian General Electric Company, Ltd., Toronto, Ont.

5030

Electric Railway Journal

Published by the McGraw Publishing Company, Inc.

Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLV NEW YORK, SATURDAY JUNE 19, 1915 No. 25

AWARD TO "ELECTRIC RAILWAY JOURNAL"

The International Jury of Awards, Panama-Pacific International Exposition, has voted to give a medal of honor to the publications of the McGraw Publishing Company, Inc., which include the Electric Railway Journal. This is the highest award granted a publishing company. The principal basis of the award is the general excellence and superiority of these publications.

JITNEY ACCIDENT COMPLAISANCE

We have adverted several times not only to the danger that the directionless jitney imposes upon the streets but to the irresponsibility of the driver when an accident does occur. The traveler in the jitney belt finds aplenty such newspaper headlines as "Killed by a Jitney," "Searching for Reckless Jitney Driver" and "Jitney Beaten by Telegraph Pole"; and on an Oakland ferryboat three elderly females were heard recently to argue a fourth out of her favoritism for the jitney purely through stating accidents that had come to their knowledge. Yet, in the light of all this, every kind of political pressure is brought to secure the restoration of licenses to drivers whose recklessness had forfeited even that little protection to the public, giving another instance of the cowardly complaisance of the minor courts. Thus, on June 5, a California jitney driver ran down and severely injured a woman. He was arrested and asked to furnish just $20 bail. Within an hour the same driver ran down a little girl, the machine breaking both her legs. Verily, "The driving is like the driving of Jehu the son of Nimshi; for he driveth furiously."

TRAFFIC SURVEY ORGANIZATION

Back of Mr. Doolittle's discussion, elsewhere in this issue, of the type of employee, organization and supervision best to be used for traffic survey work, there runs the premise that such work is of a sufficiently important character to warrant in certain cases the establishment of a special department with distinct personnel to provide for its thorough development. We heartily agree with this general statement, but also with the restriction placed upon it by Mr. Doolittle—that while such a method would insure the highest efficiency and the most complete and accurate results, many companies on account of their small size or peculiar organization and operating conditions cannot adopt it. It is difficult to draw the line at the proper point, for no strict classification can be made on the basis of revenue or operating statistics. Yet the point to be remembered is that even if a company is not so large as to allow it to use the special department method as a means of collecting the maximum amount of data at a minimum cost, entire neglect of traffic study is not warranted. Companies of medium size, with regular inspectors, conductors and transportation office clerks, can secure effective results along this line if the work is carried on regularly and systematically under the direction of the superintendent of transportation. In the case of the smallest companies, occasional studies by office employees and the older conductors under the manager's orders can well be made. The necessity and the value of traffic surveys form the vital point; the physical means of accomplishing such work is a minor problem of each management to be settled with business judgment in the light of local conditions.

CHICAGO RAILWAY TERMINAL REPORT

The report of the Chicago Railway Terminal Commission, just rendered, is very careful to avoid any direct recommendation on the subject of electrification. On this point the commission is awaiting the report of the committee on smoke abatement and electrification of the Chicago Association of Commerce, and its particular duty was to report on the most practical rearrangement of the passenger and freight terminal facilities and service in Chicago. Nevertheless, in the analysis of this subject we can read into the report only the logical conclusion that electric motive power is the final answer to the problem in Chicago as well as in other large cities where similar problems are presented. In its discussion of the passenger terminal question the commission clearly points out the necessity for improving the facilities for distributing passengers, especially suburban passengers, after reaching the terminal, by the method of through routing, in other words of applying to the situation the same principles which would be used on a city transportation system. Such a plan would not only reduce greatly the expenses incident to the present competitive system with enormously expensive and inconvenient individual terminals, but would produce a greater intensive use of the property required and would be of much convenience to the traveling public. The principles outlined here for the handling of passenger traffic applies in equal measure to that of freight, and while no comparative figures are presented by the commission, it may be inferred that the economies obtained by the salvage of valuable real estate in the central district of the city from railroad purposes would go a long way toward defraying the cost of making the changes.

THE CHICAGO STRIKE

The real issue in the short-lived Chicago strike was the principle of arbitration. At first the men flatly refused to accept any arbitration at all, saying that they were the sole judges of what constituted fair wages; then, seeing public opinion and the press failed to support them in this attitude, they proposed to limit the choice of third arbitrator to one of five men in a list submitted by them. This claim, according to the Chicago *Evening Post*, was tantamount to the demand that they "should have the right of naming two of the three arbitrators" and "guarantees in advance that they would win their case." It is not strange that such an attitude was of direct benefit to the companies and, coupled with the unflinching position of Mayor Thompson in favor of fair arbitration, brought about the final decision.

We sincerely trust that the board now selected to decide the questions at issue will not merely seek a compromise, as too many boards in the past have done. On account of the size of the railway systems and the number of people dependent upon them for transportation, the question is a very important one. Three years ago the Chicago surface railways established a rate of wages higher than that paid in any other large city in the United States east of the Rocky Mountains, and by it 60 per cent of the trainmen have received more than $1,000 annually. Yet the men are demanding an increase in the minimum wage of more than 40 per cent and in the maximum wage of more than 12 per cent, as well as changes in the working conditions which will still further increase the operating expenses. Obviously there must be some limit. The companies cannot go on indefinitely increasing wages, especially when, as is the case at present, the companies have no difficulty in engaging all the men they need to work at the existing scale. It is said that the employees were opposed to arbitration because in an arbitration hearing on wages to which they were parties three years ago they did not secure all of their demands, but this is not surprising when it is realized that to grant their demand on the wages question alone now would cost the companies $1,500,000 a year. As opposed to the attitude of the men, the companies declared that they were perfectly willing to submit the entire matter to arbitration and even agreed that conditional on arbitration the present state of wages would not be lowered and that working conditions, if changed, should be not less favorable.

As the matter is now in the hands of the arbitrators we shall not attempt to anticipate their decision. Under the ordinance of 1907 the city is now a more than equal partner with the companies in the profits of the surface railways and so is directly interested in having them run on a business basis. This is entirely independent of the natural desire of any city to have such an important agency in its development as the local railway system at least fairly prosperous. Just how far this participation in the profits of the system by the city will affect the settlement of the present problem it is impossible now to state. There are no precedents in this country to show. It is not amiss, however, to say that the present seems an inopportune time in practically every business for employees to talk of increased wages. The country is passing through a period of business depression and unemployment in which almost every line of industry has suffered. This has been especially the case with the electric railway industry, and the spread of the jitney with its effect on the gross receipts has practically capped the climax. A solution for the present situation must come because there is no agency which can perform the necessary service of city and interurban transportation as cheaply as the electric railway, and the country cannot afford to have a stoppage of new electric railway construction. But just what this solution will be is still a question of the future. If the railways, during this period of business depression, should follow the practice of most industrial companies under similar conditions, they would reduce wages 10 per cent or more, or put the men on part time, or both. It is certainly not a favorable season in the electric railway business for either men or officials to talk about an increase of wages or other changes which will increase the operating expenses without adding to the gross receipts.

CONTINUOUS VS. NOMINAL RATING OF RAILWAY SUBSTATION MACHINERY

It is understood that at the Deer Park convention of the American Institute of Electrical Engineers which is to be held during the last week of this month the standards committee will propose for the consideration of the board of directors a revision of the standardization rules as they relate to the rating of railway substation machinery. These revisions will be in the direction of bringing the rating of this class of machinery more nearly into conformity with the rating of other classes of electrical machinery. The circumstances leading up to this recommendation are briefly as follows:

Several years ago rating of electrical machinery received very thorough consideration by engineers in every country where such machinery is made. The result was an international agreement upon the principles of rating, which principles were adopted by the American Institute of Electrical Engineers in the standardization rules issued Dec. 1, 1914. This continuous rating is based upon the load which can be carried indefinitely with specified observable temperature rises shown by experience to be safe for the type of insulation employed and allowing for an ambient temperature of 40 deg. Cent. While the rating of nearly all electrical machines follows these principles, a notable exception was made in the case of railway substation machinery at the request of certain engineers and these machines received a special rating called "nominal."

The system of continuous rating is so simple and rational that it is difficult to realize that it was evolved as the result of years of painstaking study and experimental work. In it the temperatures attained with rated load correspond to the maximum safe tempera-

tures which the insulation will stand. It is therefore not permissible to "overload" machines which are running continuously at rated load. It should not be inferred from this that machines to be built in the future will be different from those built in the past. It will be possible to obtain any reasonable kind of machine by specifying its load requirements and leaving the manufacturer to supply the rating, as is now done with railway motors and locomotives.

On the other hand, in accordance with the nominal rating a machine, after running at nominal rated load continuously with an unspecified temperature rise, has its load increased 50 per cent for two hours, at the end of which period no part of the insulation shall exceed the standard temperature rises. The nominal rating of a given machine is, therefore, less than its continuous rating, and unlike the continuous rating its definition involves the assumption of certain characteristics, not only of the machine, but also of the load which the machine is expected to carry, a most extraordinary idea not at all in keeping with the clearly conceived system of rating used for other machines.

Before the present rules were adopted making specific provision for railway substation machinery, instead of one temperature rise limitation there were two, the lower applying to the continuous load and the higher to certain overloads superimposed upon the continuous load. It is now known that a given machine will have a nominal rating considerably less than its old A. I. E. E. rating, and that the manufacturers are embarrassed by this reduction. In fact, a movement has been started to revise the definition of nominal rating so as to make it more nearly equivalent to the old A. I. E. E. rating. Rather than make such a revision, why not relegate the nominal rating to a secondary place and rate railway substation machinery like other electrical machinery? The proposed revision is a step in this direction and should have the approval of the electric railway industry.

BASING DEPRECIATION ON PAR VALUE

The Nebraska State Railway Commission is pursuing a method of handling depreciation that should be of wide interest to utility operators on account of the peculiarly arbitrary yet facile way in which it has slid over the knotty sections of the problem. In these days when utilities and commissions are generally finding multitudinous points of difference in regard to the distinction between maintenance and depreciation and in regard to the proper life tables and depreciation rates for various classes of property, the Nebraska commission has tackled the problem from the other side in an apparent endeavor to find an easier solution.

Believing that maintenance and depreciation are so intermingled that it is impossible to establish an accounting system that will adequately and accurately separate the two, the commission simply handles these items together. Furthermore (while the commission has no established policy to the following effect), wherever practicable it forgets class rates and bases the allowance for the maintenance and depreciation reserve on the par value of securities issued. It is assumed that the amount issued covers the actual physical value of the property, plus a reasonable allowance for financing and promotion, so that this plan affords a fairly equitable basis for the maintenance and depreciation allowance. The percentage chosen varies with the character of the utility affected, the rate for a water company thus being lower than that for a telephone property. In a recent security authorization for the Omaha & Lincoln Railway & Light Company, the annual rate was 7 per cent, while a review of this commission's orders in 1914 shows that in some telephone cases it allowed 9 per cent and for such cases regards 8 per cent as the minimum allowance.

Concerning the practice of combining the maintenance and depreciation allowances, little need be said, for this is a means that has been recognized in various sources as the most expedient permissible solution of a most intricately technical problem. The basing of the combined allowance upon the par value of securities issued, however, is more of a novelty. It is true that such a close basic relation between investment and physical value was legally recognized as existent under the strict Massachusetts stock laws in the Middlesex fare decision, and various commissions now insist that the par value of newly authorized securities be covered by the actual value of the property. Yet few commissions have to our knowledge had sufficient faith in their own security-supervising ability to use such issues as a basis for operating calculations. The Nebraska commission does not itself seem to regard physical value and investment value as exactly interchangeable, as is shown by its practice in valuation cases, but it feels that these are sufficiently near to permit this somewhat rough-and-ready method of handling depreciation. With the yearly rate properly selected according to experience, this practice provides a reasonable protection for bondholders—provided local conditions in various sections of the State do not cause maintenance costs to vary so unduly as in some cases to leave no provision whatever for depreciation.

The chief point of value in this method, however, lies in the commission's recognition of the difference between the reserve for depreciation and actual accrued depreciation. We have at various times emphasized the fact that an arbitrary percentage chosen to facilitate the accounting treatment of depreciation over a certain period has no conclusive bearing upon the actual deterioration of property during the period. That the Nebraska commission agrees with this distinction is evident from the fact that in all rate cases it disregards its yearly accounting allowance for maintenance and depreciation and fixes an allowance on the basis of an actual appraisal.

Utility operators who have in the past been trying to make this difference clear to commissions can indeed see a glimmer of hope coming out of the State of Nebraska.

Michigan Railway's 2400-Volt, Third-Rail Line

This 94 Mile Road, the First of Its Kind to Be Built, Has Just Been Placed in Operation, Being Designed for Speeds Up to 90 M. P. H.—The Project, Which Was Conceived by the Late W. A. Foote, Includes a 44-Mile Section of Electrified Steam Line

Another link in the chain of interurban railways and electric light and power lines owned by the Commonwealth Power Railway & Light Company, Grand Rapids, Mich., has just been turned over to the Michigan Railway, the operating company. This new line marks a milestone in high-speed electric railroad development, since it is the first 2400-volt, third-rail line ever constructed. Moreover, it represents the culmination of another dream of the late W. A. Foote, who as vice-president of the Commonwealth Company had the courage to install the first 140,000-volt transmission line.

The 50-mile Kalamazoo-Grand Rapids section of the new line has been built for speeds up to 90 m.p.h. and is probably as fine an example of finished, modern electric railway construction as will be found in this country. The 44.5-mile steam road which forms the remaining part of the route was purchased from the Michigan Central Railroad and runs between Allegan and Battle Creek.

Necessity for New Line and Its Service

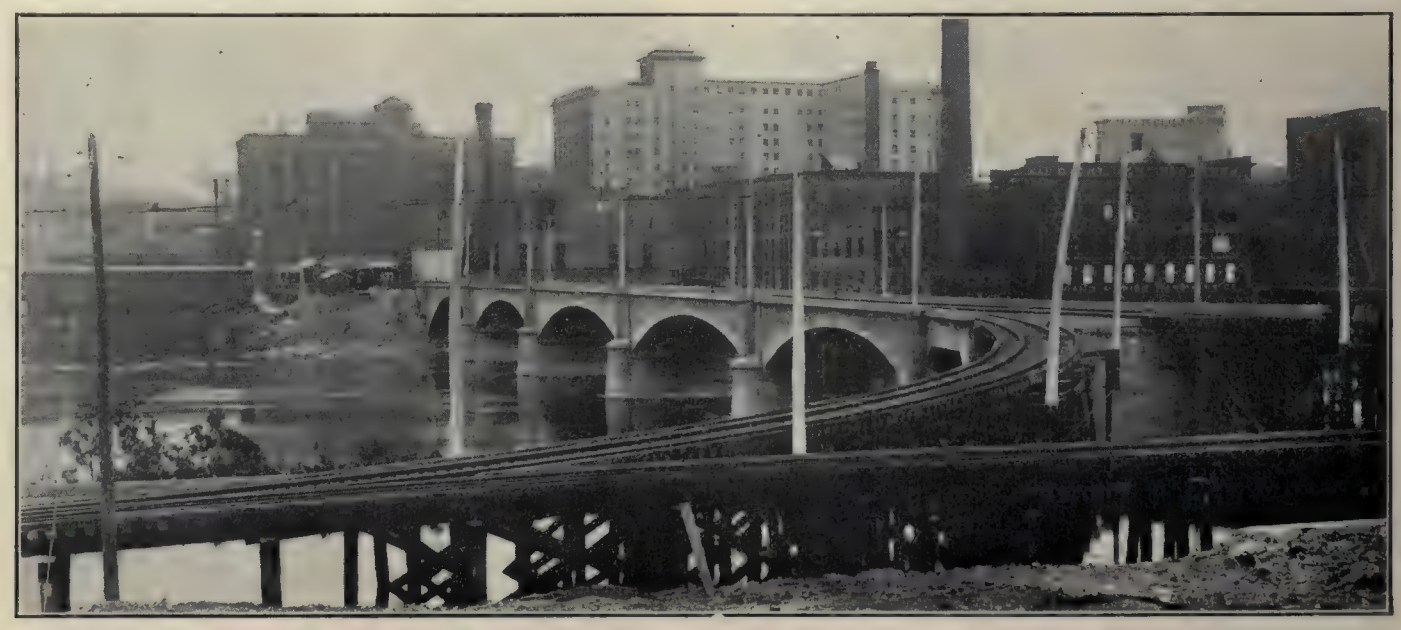
Infrequent steam-road service or none at all was the prime reason for connecting Grand Rapids with Kalamazoo by means of this high-speed electric line. In general, lower Michigan is peculiarly situated, being bounded on three sides by three great lakes, and as a result, only the extreme southern part of the peninsula is served by steam railroad trunk lines. During the entire year there is traffic east and west across the state, and during the summer months, the north and south traffic to the numerous summer resorts in this State reaches considerable proportions, so that steam railroads have been built only to cater to the transcontinental service and to furnish ingress and egress to the summer resorts. As a result but little provision was made for intercommunication between the different parts of the State.

In recent years, Grand Rapids, Kalamazoo and Battle Creek have grown rapidly, and there has arisen a demand for frequent high-speed service between them. Grand Rapids is a large furniture manufacturing center with a population of over 125,000, and a natural line of intercommunication existed between this point and Kalamazoo, another manufacturing city of 40,000 people, and Battle Creek, the home of prepared breakfast foods, a city of 30,000 inhabitants. Before the completion of this new line there was no direct railroad route between Battle Creek and Grand Rapids and only infrequent service between that point and Kalamazoo.

To develop the passenger, freight and express traffic between these points three classes of train service have been inaugurated. These include both local and limited trains, and a special service known as the "Flyer." Single cars from Kalamazoo and Battle Creek are coupled together at Monteith Junction, which is 18 and 30 miles distant respectively from the two terminals, and from this point they run as a two-car train into Grand Rapids, a distance of 32 miles.

Local trains make eleven round trips daily on the Grand Rapids-Kalamazoo line, and the run requires one hour and forty-five minutes. Two local trains make round trips between Grand Rapids and Battle Creek, which requires two hours and twenty-five minutes each way. Limited runs between Grand Rapids and Kalamazoo are made in one hour and twenty minutes and the run from Grand Rapids to Battle Creek takes two hours and ten minutes. The limited service comprises four trains to Kalamazoo and seven to Battle Creek. The third class of service, known as the "Flyer," is furnished only between Grand Rapids and Kalamazoo, and the 50-mile run is made in one hour and ten minutes. Both at Kalamazoo and Battle Creek, the Michigan Railway connects with the lines of the Michigan United Traction Company, a subsidiary of the same holding company. Passengers for points east of Battle Creek or between that point and Kalamazoo, are required to transfer. At Grand Rapids the new line intersects the Grand Rapids, Holland and Chicago Railroad, which is planning to abandon its entrance over city streets and will use the double track line and terminals built by the new road.

All the cars purchased for the new line are of steel



MICHIGAN 2400-VOLT LINE—CONCRETE BRIDGE OVER GRAND RIVER AT GRAND RAPIDS

construction, particularly well equipped and finished. Those in the "Flyer" service are especially fine all-steel coaches with side doors and observation chair-car compartments. These were described on page 1087 of the May 16, 1914, issue of the ELECTRIC RAILWAY JOURNAL. The cars used in local and limited service are also of all-steel construction, but are of the standard arched-roof interurban type with the entrance and exit doors in a rear vestibule. These cars were described on page 106 of the ELECTRIC RAILWAY JOURNAL for July 18, 1914. All-steel express trail and motor cars were also purchased for the package freight service. On the electrified steam road division, the Michigan Railway took over a bulk-freight and express business, and the development of this class of traffic is also planned for the new line.

ROADWAY CONSTRUCTION

The territory traversed between Grand Rapids and Kalamazoo is slightly rolling, some rather heavy cuts and fills being necessary, both near Grand Rapids and near Kalamazoo. The electrified steam road was built through a country where a number of curves and grades were required. Except for the track in the city streets of Kalamazoo, and on a section of private right-of-way in Grand Rapids, a maximum curvature of 3 deg. and a maximum grade of 1 per cent were obtained. Roadway standards provide for an 18-ft. roadbed on fills with 1½:1 slope and a 24-ft. roadbed in the cuts with the same slope. No unusually heavy grading was necessary on this line, although the total for the 50 miles was about 1,000,000 cu. yd. The heaviest cut, however, contained 85,000 cu. yd. and was 20 ft. deep and 2000 ft. long, while the maximum fill contained 60,000 cu. yd. and was 30 ft. deep. Reasonably cheap right-of way made it possible to standardize on a 100-ft. width except where grading requirements made more width necessary. A section of private right-of-way several miles long and sufficient for double track, was purchased through Grand Rapids.

MICHIGAN 2400-VOLT LINE—MAP OF SOUTHERN MICHIGAN, SHOWING MICHIGAN RAILWAY AND ALLIED LINES

All right of way is fenced with a 48-in., No. 9 American Steel & Wire Company's woven fencing, fastened to 5-in. top, 8-ft. cedar posts, spaced 16½ ft. apart. Wing fences and cattle guards are provided at all road crossings where the lower half of the fence is formed of 27-in. hog-tight woven wire. Above this are nailed two 1-in. x 6-in. boards, which are painted white so that the motorman can see a crossing well in advance of his train. A 14-ft. American Steel & Wire Company's tubular steel gate is used as standard at all private crossings, and the cattle guards are formed of ingot-iron metal strips with projecting angular spikes, laid side by side and spiked to the ties.

WATERWAYS

All waterways and under or over crossings are of concrete or combined concrete and steel. A rather unusual feature in connection with the smaller openings is that all reinforced concrete pipe, which was furnished under contract by the Chicago Reinforced Concrete Pipe Company, was made on the right-of-way with a portable concrete mixing plant which was moved along the line to minimize the haul of the completed pipe. All bridges and viaducts, except those to carry

MICHIGAN 2400-VOLT LINE—OVERHEAD CONSTRUCTION AT DRAWBRIDGE

MICHIGAN 2400-VOLT LINE — VIEW SHOWING CHANGE FROM THIRD RAIL TO OVERHEAD CONTACT WIRE

foreign roads, are designed for Cooper's E-40 loading which is approximately equivalent to a 100-ton car. At points where the electric line passes under a steam railroad or a highway, a clear vertical and horizontal opening 16 ft. square has been provided. The standard overhead highway crossing comprises three short deck spans with the bridge ends resting on abutments and the central span supported on structural steel bents which in turn rest on concrete foundations.

Two bridges of unusual size have been constructed over the Grand River in Grand Rapids. The lower Grand River bridge is made up of seven 88-ft. deck girders resting on concrete piers, the two central spans of which rest on a circular pier and are designed as a draw span. Double-track approaches to this bridge from each side close into gauntlet tracks over the bridge. This structure, with the two 59-ft. towers giving a 210-ft. feeder span, are shown in one of the accompanying illustrations. A double-track, reinforced concrete bridge has been constructed at the upper Grand River crossing. The Grand Rapids passenger terminal yards are at one end of this structure and a freight yard and tracks leading to a repair shop at the other end. The bridge provides a 25-ft. roadway and comprises four 96-ft. arch-spans and one 99-ft. 9½-in. central span. This structure was designed by D. B. Luten of the National Bridge Company of Indianapolis, Ind., and is shown with the business district of Grand Rapids in the background in one of the illustrations.

Track Construction

All track, including main line and sidings, is laid with 80-lb. A.S.C.E. rail on 6-in. x 8-in. x 8-ft. cedar ties spaced twenty to a 33-ft. rail. Every sixth tie is 10 ft. long and furnishes support for the third rail. Other track standards include No. 12 rigid frogs, 18-ft. switch points and 90½-ft. leads for all turnouts in the main track. All passing sidings are made approximately 1000 ft. in over-all length, and the standard of construction on passing sidings is equal to that on the main track. Special sawed-oak switch ties and high switch stands with fixed switch-targets are used in all main-track turnouts. All turnouts, including the switch stands, as well as the manganese-steel rail-bound crossings at all grade intersections with foreign roads were furnished by the Cleveland Frog & Crossing Company. It is interesting to note that all grade crossings with other railroads are interlocked, and the signal protection includes mechanically-operated home signals and electrically-operated distant signals for both lines.

Third-Rail Construction

Special interest attaches to the third-rail construction because it is the first to be installed to conduct a 2400-volt propulsion current. Along the main line this is an 80-lb. A.S.C.E. section, low-carbon rail rolled especially for this road. The specifications provide for carbon to be not over 0.14, manganese to be not over 0.40, sulphur to be not over 0.08 and phosphorus to be not over 0.11. The rail is guaranteed to give a relative conductivity with copper of one to eight. The rail is mounted on a three-petticoat insulator furnished by the Ohio Brass Company, and this in turn rests on the 10-ft. track ties. The center of the third-rail is 32 in. from the nearest gage line of the track, and the top is 8-15/32 in. above the surface of the track rail. It is also interesting to note that, on continuous stretches of 1 mile or less in length, this third-rail is laid with expansion joints one and one-half times as wide as those allowed for standard track joints. Where the stretch of third-rail is more than 1 mile long, twice the standard track expansion is provided at joints.

Approaches to the third-rail level at all crossings are provided by bending the rail to form a 4-ft. incline with a total rise of 3 in. The third-rail is drilled with one hole at each end to serve for bolting the malleable-iron fish plates, these being so designed as to produce no strain or unusual friction and being slotted to allow for expansion. The third-rail rests on malleable-iron castings, which in turn dowel to the 8¼-in. two-petticoat, two-piece insulators. These insulators were tested at 5000 volts. They are held in place on the ties by a square, malleable lug, which is fastened with a lag screw and fits into a recess in the insulator base. The dimensions of the cap casting are such as to prevent free longitudinal movement of the third-rail. Lugs on this casting, 1 3/16 in. high, keep the rail from shifting out of line. Third-rail joints are bonded with 7-in. 500,000-circ. mil. bonds of the copper-ribbon compressed-terminal type furnished by the Electric Service Supplies Company.

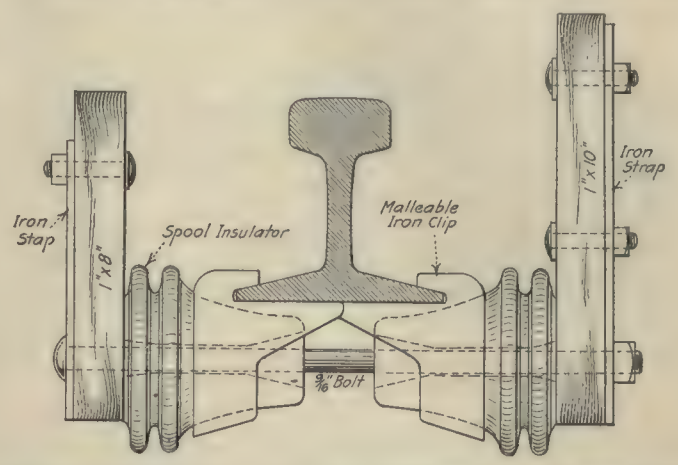
On industrial sidings and passing tracks the third-

MICHIGAN 2400-VOLT LINE—VIEW SHOWING THIRD-RAIL BEFORE INSTALLATION OF GUARDS. TELEPHONE JACK BOX AT LEFT

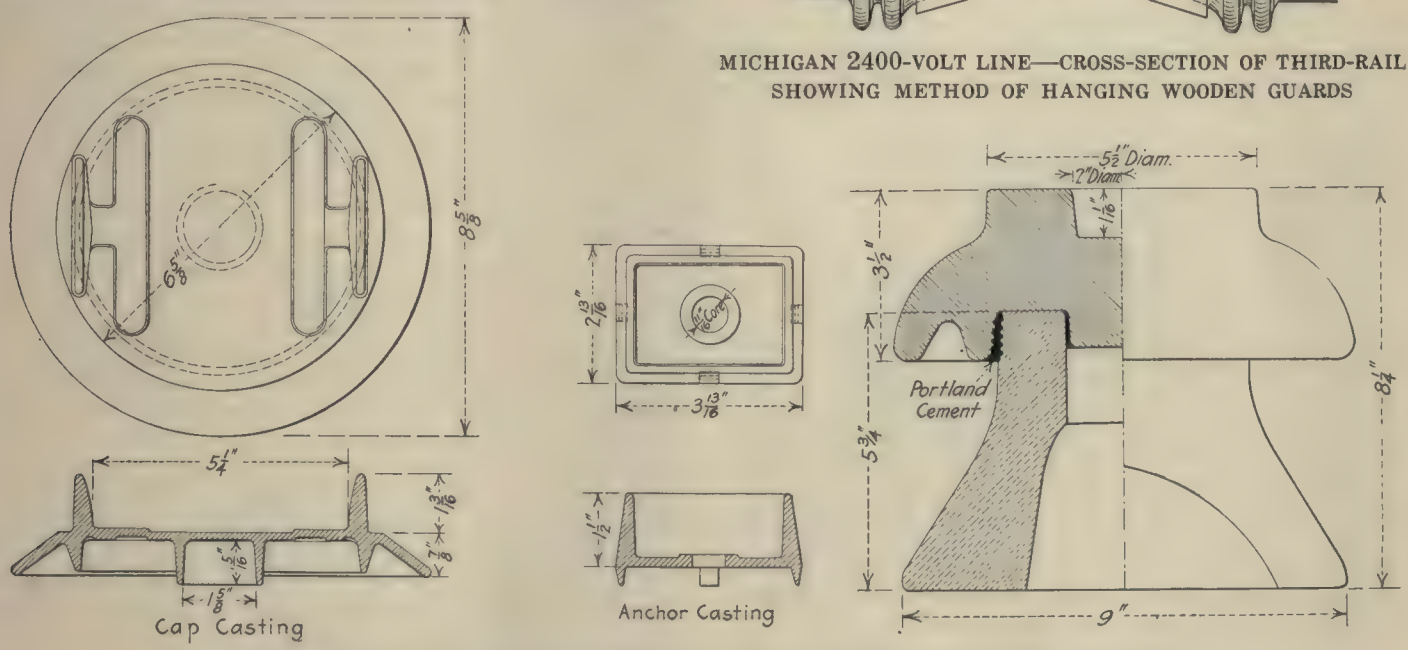
rail insulator is the same as that on the main line, but the third-rail is of 52-lb. weight. To obtain the same horizontal and vertical clearance as that for the main track third-rail, special malleable-iron cap castings were employed. The third-rail at these points is bonded with 250,000-circ. mil bonds of the same type as those used on the main track.

The third-rail is guarded on both sides to afford protection to men working on the track. The guard on the track side is a 1-in. x 8-in. fir board, the top of which is level with the third-rail. The guard on the outside is 1 in. x 10 in. in size, and the top is 2 in. higher. In this position these guards prevent a bar or any other piece of metal which may drop across the third-rail from coming in contact with it. The guard boards are 16-ft. long and are fastened together at the ends with malleable-iron plates containing holes punched oblong to permit expansion and contraction. They are fastened to the rail by two malleable-iron clip castings, which fit on the bottom of the rail and are insulated by two porcelain spool insulators. One end of this insulator sets into a recessed casting, and the other sets flush against the guard board.

At all highway crossings, as well as at points where the propulsion current conductor changes from third-rail to overhead, jumpers are provided. At the high-



MICHIGAN 2400-VOLT LINE—CROSS-SECTION OF THIRD-RAIL SHOWING METHOD OF HANGING WOODEN GUARDS



MICHIGAN 2400-VOLT LINE—THIRD-RAIL INSULATOR AND INSULATOR CASTINGS

way crossings these consist of 1,000,000-circ. mil bare-copper feeders suspended from a ½-in. steel messenger cable strung from two 30-ft. wooden poles over the crossing. The ends of the jumper are connected to the third-rail by special terminals. An overhead clearance of 21 ft. above the crossing is provided, and the poles are securely anchored to dead men. The same cable and special terminals are used in the jumpers where the third-rail joins with the overhead trolley. At these points, however, the jumpers pass from the third-rail to insulators on the latticed steel poles which are standard in all overhead construction.

OVERHEAD CONSTRUCTION

Three types of catenary trolley suspension are used at different locations along this new line. Where there are two tracks, the line is spanned at 300-ft. intervals by double-track, special-galvanized steel bridges, built by the Aermotor Company, Chicago. The legs are 32 ft. 1 in. long and set 5 ft. in concrete, and this gives a trolley clearance of 19 ft. above the top of the rail. The clear width between the legs is 29 ft. 10 in. In connection with the design of these bridges it is interesting to note that each is required to withstand a vertical load of 1200 lb. with a factor of safety of two. The structure is also designed for horizontal load parallel to the line of 12,000 lb., distributed at four points on the upper channel. At right angles to the line and equally distributed on both sides, the bridge must carry a load of 4000 lb. with a factor of safety of two.

Trolley suspension on the 300-ft. spans is of the catenary type with a 500,000 circ. mil hard-drawn, copper-cable messenger having maximum sag of 6 ft. 6 in. This cable is designed to withstand 6324 lb. in tension, which will obtain when both the cable and the trolley are subjected to a coating of ½ in. of ice and a wind velocity of 65 m.p.h. The No. 0000 trolley is attached to the messenger by rigid hangers furnished by the Ohio Brass Company. These hangers are spaced at 15-ft. intervals, and hence give a twenty-point catenary suspension on the 300-ft. spans. On curves up to 4 deg., no pull-offs are necessary, the messenger being so attached to the bridge that it permits the trolley to take a natural curve. This pulls the plane of the messenger to a 45-deg. angle from the vertical, and in this position the hangers hold the trolley in its proper position.

SINGLE-TRACK OVERHEAD CONSTRUCTION

Single-track overhead construction is suspended from special galvanized, hot riveted, steel latticed poles set in concrete. These poles also were furnished by the

MICHIGAN 2400-VOLT LINE — CATENARY-BRIDGE CONSTRUCTION NEAR GRAND RAPIDS

Aermotor Company. They are designed with a factor of safety of two, for a load of 2000 lb. applied at the top and at right angles to the line. They will also support a vertical load of 1600 lb. at a point on the mast arm 10 ft. from the center of the pole.

These poles are set 165 ft. apart on tangent track, or thirty-two to the mile. The messenger on single track is also a 500,000-circ. mil hard-drawn, copper cable with a total tensile strength of 26,400 lb. In the 165-ft. pole spacing, the messenger sags 4 ft., giving a tension not to exceed 3200 lb. when both the messenger and trolley are coated with ½ in. of ice and the velocity of the wind is 65 m.p.h.

The No. 0000 trolley wire is attached to the messenger with rigid hangers 15 ft. apart. In the single-track overhead construction, no steady strains or pull-offs are used on curves up to 6 deg. since the messenger is so hung that it serves both as a messenger and a brail wire.

In order to give to the overhead circuit the same conductivity as the third-rail, a 500,000-circ. mil copper cable is provided. On single track this feeder is carried on a small arm on the inside of the pole, and on double-track bridge construction this feeder is suspended beside the messenger and has a sag of 6 ft. Sectionalizing switches are installed at each town so that any section of the third-rail and overhead may be de-energized.

Where siding tracks parallel the main track the latticed pole with a mast arm is used for the main track, and a wooden pole for the side track. The overhead construction for the side track usually comprises a No. 00 steel trolley wire attached to a cross-messenger suspended between the wooden pole and one end of the mast arm on the steel pole.

Surge Protection

With a conductor as large as the 80-lb. third-rail, it was necessary to provide surge protection. This consists of a series of aluminum cells with shunting resistances in each to balance the discharge. The series of cells is connected to the line through proper switches, fuses and self-clearing gaps. Each cell comprises a pair of concentric aluminum plates, positive and negative, properly separated and immersed in an electrolyte. Each plate is coated with a special electrolytic film. The air gap is set at a predetermined value and operates only when an excess energy impulse or surge is produced by an instantaneous release of the inductive energy of the rail due to a short circuit or other external cause.

The energy release manifests itself as an increase in voltage, the current approaching zero and the voltage increasing rapidly. The aluminum cells drain this excess energy from the rail to the ground through the large discharge surface of the aluminum plates. The effect of the plates is to produce a large current in the cell, due to the low resistance of the electrolyte. Accordingly the voltage peaks may be limited to any amount simply by increasing the number of cells, and caring for any known condition is simply a question of arriving at the right number of cells. The effect of these cells is similar to that of a safety valve on a steam boiler in that energy in excess of the normal value is permitted to escape by means of the air gap when abnormal conditions obtain.

Sources of Energy

For the present the road, which is 94.5 miles long, is being fed from substations at Grand Rapids and Kalamazoo. A third source of energy will be furnished as soon as the transmission line can be completed into Battle Creek. At the Grand Rapids and Kalamazoo substations, energy is supplied at 2400 volts by connecting two 1200-volt rotary converters in series. The Battle Creek substation will feed the line at the same voltage, but from a motor-generator set. At Monteith Junction, where the Allegan-Battle Creek and the Kalamazoo-Grand Rapids lines cross, disconnecting switches have been installed so that either of the three branches of the road may be cut off. The feed from Monteith Junction to Grand Rapids is 28 miles, to Battle Creek 29 miles, and to Kalamazoo 18 miles. A short section of feeder line also extends from Monteith Junction to

MICHIGAN 2400-VOLT LINE—STANDARD BRICK AND WOODEN WAITING STATIONS

Allegan, a distance of 11 miles. The substation equipment and protecting devices were furnished by the General Electric Company.

WARNING SIGNS

An electric line that uses energy at this unusually high potential in a third-rail must necessarily be thoroughly fenced and supplied with warning signs. All the signs used are uniformly of blue enamel with white letters. At each side of every road crossing, there is suspended from a copper cable, a small danger sign. Also fastened to the wing fences on each side of the road, signs approximately 18 in. x 24 in. in size warn trespassers against the dangerous third-rail. Other types of signs displayed along the right-of-way include whistle, station, distant siding and bridge signs, and all are made of sheet metal with blue and white lettering. Where it was necessary to mount these signs on independent posts, they were attached to special galvanized angles set in concrete.

Unusual signs are also employed to indicate to the motorman the change from 2400-volt to 600-volt trolley, which is necessary when the cars leave the new line to enter the city streets of Kalamazoo, Grand Rapids and Battle Creek. These signs are illuminated by three 40-watt Mazda lamps, receiving their energy from the 600-volt trolley, and each one is 15 in. wide by 39 in. long, being suspended from four I-bolts beneath the mast arm about half-way between the trolley wire and the pole. An arched metal hood projects from the top of the sign over the lamps and serves both as a reflector and as a protection against the weather.

TELEPHONE LINES

Three copper metallic return telephone lines were strung on separate poles set along the edge of the right-of-way. Two of these lines are used by the railway company, one for commercial purposes and the other for train dispatching, and the third line is for the Commonwealth Power Company's dispatchers. Jack boxes on angle brackets are installed beside the head blocks at all passing sidings. If the telephone line is on the side of the track opposite the head block, the wires are carried down the line poles in conduits, thence underground to a special pole set beside the head block which supports the jack-box brackets. If the head block is on the same side of the track as the telephone pole line, the special pole is fitted with a cross-arm and merely serves to carry the telephone line to the conduit which extends from cross-arm to jack box.

STANDARD STATIONS AND SHELTERS

Two types of stations were constructed at the cities and villages along the new line—one a permanent brick and concrete building and the other a wooden building similarly arranged, but smaller in dimensions. At important crossroad points, wooden shelters, which cost approximately $200, are provided. These shelters are fully inclosed and rest on concrete foundations. Each one is provided with a small concrete platform.

GRAND RAPIDS AND KALAMAZOO TERMINALS

At Grand Rapids and Kalamazoo property was purchased in the heart of the business district and converted into commodious passenger stations with yard tracks for storing eight or ten passenger and express cars. At Grand Rapids the passenger and express terminal building is situated in the business district on the west side of the Grand River, and the freight house and team tracks are on the west bank of the river opposite the terminal. The freight facilities include a warehouse 50 ft. wide and 185 ft. long, built of brick, concrete and steel. Quite an extensive team-track yard, as well as a storage yard leading to a repair shop also situated at this point, have been installed.

At Kalamazoo, the terminal building combines a passenger station, baggage room and freight warehouse. Four storage tracks of sufficient length to hold two cars each, make up the terminal yards. Two of the tracks are used exclusively for passenger coaches and the other two for loading an unloading freight.

The work of building this high-grade, 2400-volt, third-rail line, and electrifying the steam road between Allegan and Battle Creek, was under the immediate supervision of George L. Erwin, president and general manager of the Michigan Engineering Company, and G. J. Wagner, superintendent of construction. During the construction period, the Michigan Railway Company was represented by the late W. A. Foote, vice-president, who promoted the line and who was responsible for many of its unique features.

Jitneys for Sale in Kansas City

The accompanying picture represents the third stage of the jitney transportation industry in Kansas City. A firm of three men which started three buses, each carrying twelve passengers, on April 1, 1915, is now offering the buses for sale. Three of the men had other lines of business and are said to have invested about $5,800 in the two Appersons and one Velie, making two

MONTH-OLD BUS FOR SALE IN KANSAS CITY

of the bodies in the planing mill of two of the company members. Two of these men drove the buses for awhile, until they found that their own business needed their attention. The third bus was driven by an outsider, who finally obtained a small interest in the company. They claim that the business would be profitable if they could give their personal attention to it, which they cannot do.

The Public Service Commission for the Second District of New York has completed moving from rooms in the Capitol and scattered offices in two buildings on Washington Avenue, Albany, to quarters provided by the trustees of public buildings on the three upper floors of the office building at 58 North Pearl Street, corner of Steuben Street. The offices of the commissioners, general offices, hearing room, filing divisions and the various engineering, legal and accounting bureaus gathered under one roof will greatly facilitate the business of the commission. The general offices are located on the fifth floor.

Report of Chicago Railway Terminal Commission

Co-operative and Distributed Terminals for Freight and Passengers Are Recommended

The Chicago Railway Terminal Commission, of which John F. Wallace is chairman, has submitted a preliminary report to the Chicago City Council committee on railway terminals, summarizing the result of its trip to Europe last summer and discussing the needs of passenger and freight terminals in the city of Chicago.

In its letter of transmittal the commission says that in addition to studying the Chicago situation it has made personal examination on the ground of terminals in Toronto, Montreal, Boston, New York, Liverpool, Manchester, London, Paris, Brussels and Antwerp. It has also had referred to it five ordinances and fourteen resolutions orders and communications in regard to electrification and smoke abatement, but it considers it unwise to formulate any views thereon until after the report of the Chicago Association of Commerce committee of investigation on smoke abatement and electrification of railway terminals. As this latter committee has spent four years and several hundred thousand dollars in the accumulation of facts and in the investigation of this subject and as the question of the electrification of the roads and the rearrangement and unification of track facilities are closely interlaced, the commission says that they should be carefully considered in conjunction with each other.

In its preliminary report the commission first described its organization and membership, which consists of Walter L. Fisher, Bion J. Arnold, E. H. Bennett, the Commissioner of Public Works, the corporation counsel, the chairman of the committee on railway terminals, and John F. Wallace to act as chairman. The solution of the railway terminal problem, according to the commission, requires elimination of the waste due to unnecessary and uneconomic duplication of freight and passenger facilities. It says that in the terminal district in Chicago the unnecessary complication of terminal facilities and operating costs is so extensive that it is appalling in its effect upon the railroads, the shippers and the public. The investments by railroads in unused or little used property to protect real or fancied competitive positions or interests is also a source of great expense to the railroads and ultimately to the public.

The report does not recommend a single terminal but a series of interconnected union terminals. Thus it says that a single union passenger station, even if principally devoted to through passenger service, should not be made so large or embrace so many roads that its very size reduces its advantages below those that would come from dividing the service among two or more union stations. The advantages to the railroad as well as to the public of co-operative passenger stations would be more generally recognized if it were not for the mistake which has hitherto been made in many union passenger stations of erecting monumental buildings, not only for their imposing architectural effects, but also to provide accommodations for through passengers and suburban passengers in the same building. The huge size of many union passenger stations, it says, could be materially reduced by recognizing the different necessities of the suburban and through service. The two classes of service do not desire or require the same accommodations. Each would be better served if given separate accommodations more directly adapted to its needs. The suburban service is, in many respects, more nearly related to the service performed by street and interurban railway lines than to the through service of the steam railroads, and these various services can be co-ordinated with great advantage, and in a manner to secure a more intensive utilization of existing rights-of-way.

The commission is also convinced that the co-operative principle recommended for passenger service should be applied also to the freight service. This means the establishment, for example, of a number of universal freight receiving stations for outbound l. c. l. freight, so that shippers may deliver to these stations for all the railroads or for properly classified groups of railroads. This would greatly reduce the amount of teaming and street congestion which results from unnecessary teaming. The commission also believes that serious consideration should be given to the advantages of the two or more level plans in the future development of freight facilities in congested terminals. This plan increases the capacity of a given area considerably more than 100 per cent, depending upon the nature of the plan used.

In referring to electrification the commission says in brief: "Both the railroads and the public are looking forward to the substitution of some less objectionable motive power for the present steam locomotive, especially in the operation of passenger terminals and terminal tracks. Without anticipating the findings of the report of the committee on smoke abatement and electrification, it seems safe to assume from the evidence generally available that electricity is the only motive power other than steam that has demonstrated its practicability for such extensive application as would be necessary in Chicago. It is also apparent that the cost of electrification would be greatly reduced by simplifying and unifying the passenger tracks entering the city, by removing the present tangle of cross lines, by establishment of direct instead of round-about routes within the city, and by the joint use of tracks available for and adequate for more railway companies than those which now use these particular tracks. The adoption of outlying co-operative freight stations will greatly simplify the electrification of the more trans-central freight terminals and tracks."

The commission also recommends the straightening of the Chicago River, by which a large additional area would be reclaimed in the central business district.

The report includes a stenographic report of an interesting interview between members of the commission and H. W. Thornton, general manager of the Great Eastern Railway of Great Britain, on the subject of electrification of steam lines and suburban traffic. Mr. Thornton, who was formerly connected with the Long Island Railroad, believes that suburban commuter business should be profitable. He said that profit in passenger business does not come from carrying a few passengers a long distance. It comes from carrying a great many passengers a short distance. On the long-distance trains the passenger may have a seat reserved in the sleeping car and yet occupy a seat in the cafe car, in the dining car or in the observation car. This means three or four seats for one passenger, and he can sit in only one seat at a time. But in the suburban business he has only one seat, and this is how the trains are filled. This makes the suburban business a profitable one. According to Mr. Thornton, if the Pennsylvania Railroad in New York, instead of building its lines underneath Manhattan Island had built a subway down Seventh Avenue and had connected with the Long Island Railroad at Flatbush Avenue with stations in New York en route as at Thirty-third Street and at Wall Street "there would have been untold millions in it."

Central Electric Railway Accountants

Report of Meeting Held in Indianapolis on June 11 and 12—Abstract of Paper on the Relation of the Accounting and Mechanical Departments

The twenty-seventh meeting of the Central Electric Railway Accountants' Association was held on June 11 and 12 in the Severin Hotel, Indianapolis, Ind. The opening session was called to order at 1:45 p. m. Friday by the president, H. B. Cavanaugh, auditor Cleveland, Southwestern & Columbus Railway. Charles L. Henry, president Indianapolis & Cincinnati Traction Company and the Central Electric Railway Association, made the opening address. Mr. Henry spoke generally on the necessity of modern accounting, and cited several interesting personal experiences and anecdotes of early crude forms of keeping accounts. He thought that there was a possibility of too much refinement in account but believed that accounting had become an art and had been very much simplified by the standard classifications. Mr. Henry touched upon the relations between the commissions and the companies and the burdens that had been imposed upon the street railway business by city councils and other bodies, not with the intention of bettering the conditions for the public but for political effect. He thought that if the business interests were to receive proper treatment in the future, they would have to get into politics in the broadest sense and take part in the primaries or conventions, up to the final vote, and afterwards in the legislatures, so that every candidate would know that business in this country was looking after its interests.

Mr. Henry paid high compliments to the American Electric Railway Association, the Central Electric Railway Association and the Central Electric Railway Accountants' Association. What he particularly liked was the splendid team work of these organizations. No other class of business so new both in life and in character could show such results in so short a time. Mr. Henry mentioned the valuable assistance of the committee on accounts in straightening out things with the Interstate Commerce Commission, and also said that it was through the arguments and efforts of the accountants that the Public Service Commission of Indiana accepted the Interstate Commerce Commission form of report, thereby eliminating the necessity of two separate forms.

PAPER BY MR. HEMMING AND DISCUSSION

The next order of business was the presentation of a paper by R. N. Hemming, superintendent of motive power Union Traction Company of Indiana, on "The Accounting Department and Its Relation to the Mechanical Department." This paper is abstracted elsewhere in this issue. Mr. Hemming supplemented his paper by reading from the report of a steam railroad committee on reclamation, etc., printed in the *Railway Master Mechanic*. The contention of the report was that while "scrap" was usually taken to mean useless cast-off articles, the fact that articles were cast off did not imply that they were without value for other purposes. Yet, in the use of this second-hand material, care must be taken to avoid too much handling, or the cost of handling will exceed the value of the scrap. The report also contained recommendations in regard to handling of the serviceable second-hand material and the classification of the material returned to the storeroom.

In discussing Mr. Hemming's paper, L. T. Hixson, auditor Terre Haute, Indianapolis & Eastern Traction Company, believed it impossible to have any fixed classification for departmental costs for the use of several companies but explained a system of departmental costs that might be used by various companies. He stated that his company had been using such a system for some time. If the mechanical department does work for the roadway department, for example, a departmental bill covering the cost of the material and labor is sent to the auditor's office. Mr. Hixson stated that as yet no charge was made for a certain percentage to cover depreciation, use of tools or superintendence. In his opinion no general classification could be arranged to take care of all departmental charges, unless each company amplified it to meet local requirements.

W. H. Forse, Jr., secretary and treasurer Union Traction Company of Indiana, said in regard to the classification of rolling stock criticised by Mr. Hemming that he did not think it possible to make a hard and fast line of demarcation. In dealing with the Interstate Commerce Commission it had been found necessary to compromise; and if concessions had not been obtained after a hard fight with the commission, the companies might have had a classification much more burdensome. In the distribution of departmental costs Mr. Forse did not think that enough charge was made for overhead expenses. He said that manufacturing companies sometimes charged from 50 per cent to 100 per cent for productive labor, and the charge of 10 per cent to 15 per cent made by some railways was not enough. The mechanical department likes to feel it can make articles cheaper than they can be purchased outside, but in most cases if a proper per cent were added for overhead the price would be found too high.

Mr. Hixson thought that a charge for overhead should be made which could be absorbed in the departmental accounts and not appear on the books. Each department could then show the proper costs, but this would not show on the general books because of the contra credit. He did not think a charge should be made for any profit on the company's own work.

Mr. Hemming stated that it was not his idea to show any profit, but he wished to show actual costs because he thought the mechanical department was operating at a loss. He felt that the roadway department, for example, had nothing to give back to the mechanical department to offset the loss in use of tools, etc.

Walter Shroyer, auditor Union Traction Company of Indiana, thought that if it was figured closely, the power, heat, etc., furnished to the shops would take care of any losses. He said that four or five years ago the Union Traction Company of Indiana figured out the matter and found there was not a great deal of difference. If a charge for supervision, use of tools, etc., was made for doing work for other departments, it was offset by the power and heat furnished by the power department.

T. P. Kilfoyle, auditor Cleveland (Ohio) Railway, in commenting on Mr. Hemming's statement that the storeroom was usually under the control of the purchasing agent, said that the purchasing department should not have anything to do with the storeroom. The latter is a separate department. After the goods are purchased, the purchasing agent is through, and the accounting department does all the checking and should have charge. As regards scrap, Mr. Kilfoyle said that

this is reclaimed at Cleveland, and the material is used again for other purposes.

After considerable discussion, Mr. Hemming suggested that a committee be appointed to settle the various points. Mr. Kilfoyle moved that the paper be referred to the executive committee for decision as to the appointment of a committee to go into the matter further.

Balance Sheet Discussion

Mr. Hixson then read a paper on "The Analysis of the Balance Sheet." An abstract of this paper was printed in the Electric Railway Journal of June 12. Mr. Forse asked Mr. Hixson what became of the reserve for the amount represented as set aside for injuries and damages, bonds purchased, etc. Mr. Hixson explained that if, for example, the annual payment to the sinking fund was $50,000, the entry would be to charge sinking fund $50,000 and credit sinking fund reserve for the same amount. When the bonds were purchased and cancelled, the sinking fund would be credited and bonds debited. There would be no change in the sinking fund reserve. Mr. Forse thought that the balance should be a free surplus or surplus unappropriated. Mr. Hixson agreed that this was correct, but said that if the sinking fund cash was used for bonds the sinking fund reserve would still be preserved, and should be kept until the retired bonds, again capitalized. Mr. Forse asked if the cash could not be used for investment in case it was not desired to issue more bonds. Mr. Hixson stated that the reserve was not cash and could not be used in the payment of dividends, even though it had been used in decreasing the indebtedness of the property.

The report of the compiling committee was next read by C. M. Witt, general storekeeper Union Traction Company of Indiana, chairman. After a short discussion, it was approved and accepted.

The report of the standing passenger and freight committee was read by Mr. Shroyer, chairman. After some discussion on the new form of interline and local way bill adapted in size and form for use on a standard typewriter, the report was approved and accepted. The meeting then adjourned until Saturday morning.

Saturday's Session

The first order of business on Saturday morning was a short talk by P. C. Johnson, general auditor The Prest-o-lite Company, in lieu of the paper on "The General Principles of Accounting as between Common Carriers and Manufacturers" which he had been requested to prepare. Mr. Johnson related some experiences which he had as a steam railroad accountant to illustrate the trouble which may be caused by carelessness or failure to handle properly certain accounts. He thought that a great deal of attention was now being paid to the question of material and supplies on hand. These usually involve a large investment, and they should be safeguarded the same as cash. Not too much idle material should be allowed to remain in stock.

Mr. Johnson also discussed the matter of a proper inventory of such material. He thought that owing to certain practices the actual inventory usually showed above the book value. This was sometimes pointed to with pride, but it should be overcome if possible. Mr. Johnson explained that in manufacturing practice ledger accounts are kept for each class of material handled through the factory. They show what the maximum and minimum amount of material should be, to what department each kind of material is issued, value or cost, balance on hand, etc. Every day a certain number of items are inventoried and compared with the book figure. In this way, in the course of four or five months all items have been actually inventoried and adjusted to the book values, and it is not necessary to shut down the plant and take an inventory at any one date. Trial balances from the stock ledger are drawn off and show the value of material on hand.

In speaking of the balance sheet and the profit and loss statement of either railroad or manufacturing companies, Mr. Johnson stated that they must contain a certain amount of estimates. Such estimates should, therefore, be very carefully made in order to get as closely as possible to the financial condition of the company. In such cases the handling of material is as important as the handling of cash, and it should be followed up closely so that no more is carried on hand than absolutely necessary.

Mr. Hixson agreed with Mr. Johnson that the balance sheet should show everything possible, and that estimates when made should be very close in order not to prove deceptive.

The next paper was on "Electric Light and Power Accounting by a Combined Railway and Light Property," by Oren A. Small, auditor Benton Harbor, St. Joe Railway & Light Company. An abstract of this paper was printed in the Electric Railway Journal of June 12.

Mr. Hixson asked if in posting to the ledger from collection sheets a separate bill is used. Mr. Small explained that the bill is made in duplicate, a receipt for the customer and the stub for the collection agent. The collector writes the ledger account number (no names appear on the bills), and the posting is direct from the collection sheet.

In discussing the classification of accounts, A. C. Van Driesen, chief accountant Toledo Railways & Light Company, stated that Ohio had just put out a new electric classification which differs from the Michigan classification and also from that of the National Electric Light Association. They are, however, arranging a classification to meet the requirements of both states. Mr. Van Driesen explained the method used at Toledo in charging to other departments the power generated by the electric department. General expenses which apply to each one of four departments are divided on a percentage basis in proportion to gross earnings. The charge for power to the railway department is an arbitrary fixed charge, with an additional amount charged for each kilowatt furnished.

F. T. Loftus, auditor Indianapolis & Cincinnati Traction Company, described the method used by that line in making the drops to transformers for supplying lighting current to small towns along the system. There was considerable discussion as to the separation of the transmission and distribution systems in such cases.

The ensuing paper on "The Small Electric Line Handling Carload Freight," by James S. Clark, auditor Marion & Bluffton Traction Company, was abstracted in the last issue of this paper. Mr. Clark said that no tariff was filed except a switching tariff between cars on the Marion & Bluffton Traction Company and the Clover Leaf Railroad. In turning over cars to the steam road, the latter bills out the cars and the traction line does not know where they go. E. L. Kasemeier, auditor Ohio Electric Railway, brought up the matter of track scales. He said that the American Railway Association had made a ruling that no shipment that had not been weighed would be accepted under through rates. The road that weighs the car should charge the other road $3 per car. As the amount of business would not warrant small lines putting in track scales, he thought the proposed charge of $3 per car would be a serious matter to them. Mr. Hixson thought that the

summary in Mr. Clark's paper, showing the volume of business handled with such a small amount of equipment, was one of the good points and should be brought to the attention of officials to help promote greater handling of carload business. Mr. Clark stated that the revenue derived by the Marion & Bluffton line from this carload freight amounted to 22 per cent of the total revenue.

The secretary then read to the meeting by-laws which were submitted as amendments to By-laws 1 and 2 of the Central Electric Railway Accountants' Association. Upon vote, the changes were adopted as presented. The meeting then adjourned.

ACCOUNTING AND MECHANICAL DEPARTMENTS

BY R. N. HEMMING, SUPERINTENDENT OF MOTIVE POWER UNION TRACTION COMPANY OF INDIANA, ANDERSON, IND.

The relation of the accounting and the mechanical departments to the purchasing department of electric railways is so interwoven that their jurisdictions frequently overlap. The accounting department, however, has no jurisdiction over the mechanical operation of a railway property or over the supplies. The supply or storeroom department is usually under the purchasing agent, who often has peculiar ideas as to the system which should be carried out between the mechanical department and the storeroom.

There are wide variations of opinion regarding the relation of the three departments previously mentioned. It seems almost impossible to adopt any set of uniform rules and regulations that can be used universally on all properties. Various managers are inclined to operate their properties to suit their own individual taste, irrespective, in a large number of cases, of what the association or the subsidiary departments have recommended or agreed to do. It also seems that what is good for one property is not always adaptable to the others—in other words, that not every recommendation which passes the associations is a "cure-all," and sometimes the remedy is worse than the disease.

Efficient management, no matter how well worked out its details may be, cannot be fully attained unless the human factor receives careful attention. The human element in any organization is half the problem—the most important half. Full recognition of the intimate relations between cost accounting, production, engineering and the field of industrial relations, each of which has so direct a bearing on both costs and output, is necessary to build a successful organization and to attain economic operation.

To attain this economic operation, it occurs to the writer from practical experience in reference to the railway scrap heap or second-hand material which has accumulated about the property—that all second-hand material should be received in the storeroom or substoreroom and credited to the department from which it is received. This material can be taken back at full or partial value as may be agreed upon. The writer was thus able to save thousands of dollars for a large property with which he was once connected.

It is human nature to want to draw or use new material in preference to old. It would not be economy, however, to operate a separate room for second-hand or used material. The general storeroom should have complete jurisdiction over all material, either new or old. Thus, other departments which use materials which are common to all could aid the company financially by drawing on the storeroom for such material as needed—the order might be filled in whole or in part with used material. This is a question which involves the accounting department and purchasing department, but mainly the operating head. Such a scheme might find objections from the accounting department and the purchasing agent, the former on account of the extra work required to credit such material and the general accounting resulting; the latter because he is responsible for the amount of capital invested in supplies and desires to keep the investment down to a minimum. There seems to be nothing in the Interstate Commerce Commission requirements to show that such a scheme would not be acceptable, nor would it be contrary to law. This is one of the things in which the accounting department can greatly aid the mechanical department and its company by lending a helping hand.

In regard to the Interstate Commerce Commission classification of 1914, relative to Accounts Nos. 66, 67, 70 and 71, the accounting department should present objections. There are many of these items that are chargeable to the mechanical department, yet they come under the heading of "Conducting Transportation." Items pertaining directly to the operation and maintenance of equipment should be included in the accounts provided under the head of "Equipment." Take for instance Account No. 70, "Carhouse Employees." All of the items set forth in this account are under the jurisdiction of the mechanical department, yet they are listed under the transportation department. This is also true of Account No. 71.

What is the definition of rolling stock? What constitutes a snow plow or scraper? Would one not imagine that the snow scraper referred to by the Interstate Commerce Commission means a piece of rolling stock mounted on wheels? Yet are not two planks built in a "V" shape with iron plates on the bottom and fastened to the rear end of a car by ropes, a piece of apparatus that should be charged to the roadway department—likewise, rail grinder, weed burner and bonding outfit to its respective department—equally as much so as the heating and lighting of the shops and the water supply for the same should be charged to the department which uses it? If a weed burner and bonding car are charged to the motive power department, why not hand cars, and if not hand cars, why weed burners and bonding car? One is a piece of rolling stock as much as the other. If the appliances of a crane or pile driver are chargeable to the motive power department, why are not the transformers and rotaries and appliances of a portable substation rightfully chargeable to this department? Cranes and pile-driver appliances are no more used for the motive power department than is the equipment and apparatus in a portable substation. The whole thing is inconsistent.

Is it not equitable and fair that the mechanical department should charge other departments a percentage for the use of shop tools and machinery, and for the supervision of such work as is performed by the mechanical department for the roadway department, power department, etc.? If it became necessary for the mechanical department to purchase new machinery, the roadway or the power department would not be willing to stand any part of the costs of replacement or renewal of such machinery. Yet the wear and tear of doing their work is bound to depreciate the usefulness of such machinery. Each department that does work for another department, even though both are in the same company, should charge a percentage, just as much as the committee on uniform charges of repairs on foreign equipment has recommended to charge, cost plus 15 per cent. There is nothing in the Interstate Commerce Commission system of accounts to prevent such a scheme. It is the duty of the Accountants' Association to see what it can do to carry this out.

Billing of inter-departments should be put into effect.

Each department should bill the other departments on a regular billhead for any work or material furnished, so that the chief of the department can observe the cost on such work. The policy of the auditing department simply charging up these items to the respective departments is misleading to the department chiefs, as each department must make out its yearly estimate and is expected to operate within such estimate. If in checking over his monthly or yearly expenditure he does not have at hand vouchers of work done by other departments, the chief may have to his discredit many items which may be difficult or impossible to explain.

The mechanical department should, where it is consistent with the size of the property, use a calculagraph to keep accurate account of all work done for it as well as for other departments, in order to insure that all charges for labor and material are placed against the proper account and the proper departments. With the human element, errors are bound to occur. One account will be overcharged and another one under. This is a good opportunity, however, for the accounting department to lend some assistance to the mechanical department and to the company in general. The Indianapolis Traction & Terminal Company has such a system in vogue at its shops, and it has proved very successful.

Cost accounting and time-keeping should be done by the storeroom as it is, or should be in close touch with the source of supplies and production. The storeroom is usually located adjacent to the main shop, and its close relation in this respect affords a more economic means of computing time consumed and costs.

Many small items in the way of improvements are frequently being placed on cars. It is strange that when such items only amount to a few dollars or as high as $25, a construction account number cannot be secured authorizing the installation, and such items have to be charged to maintenance. No ruling is found in the official system of accounts prohibiting the issuance of the desired order, regardless of the amount involved in dollars and cents.

Forms of stationery common to the auditing or accounting department and another department should receive the co-operation of both departments. One department should not proceed with getting out printed blanks without consulting the other department involved. The use of legal-size paper should be avoided entirely, and as much as conditions permit stationery of a standard letterhead size should be used.

In the last year the Central Electric Railway Association appointed a special committee on uniform charges of repairs of foreign equipment. This greatly concerns the accounting department and its relation to the mechanical department. The writer was not in favor of a blanket proposition of cost plus 15 per cent. The items of brakeshoes, brake heads, journal bearings, journal wedges, trolley wheels, poles, harps, axle bearings, coupling hose and accessories, carbon brushes, signal lamps, etc., should be billed at a fixed price, for the reason that cost plus 15 per cent means the exposure of many contract prices. The whole subject deserves serious consideration.

There is vast room for improvement which can be obtained by closer co-operation, not only between the accounting and the mechanical departments, but all other departments. The accounting department can aid very materially by making a strenuous effort at least in the direction of securing accurate mileage data on the operation of revenue and non-revenue cars over its own lines, as well as the individual car mileage operated over foreign lines. As the purchase of supplies is regulated largely upon the mileage obtained in service, accurate mileage records should be kept pertaining to everything, especially regarding rolling stock.

The Boston Center-Entrance Trailer

Being a Description of the Construction and Equipment of the New Rolling Stock of the Boston Elevated Railway

A description of the general plan and dimensions of the Boston (Mass.) Elevated Railway's new center-entrance surface trailer was published in the ELECTRIC RAILWAY JOURNAL of Jan. 9, 1915, page 99. An order for seventy-five of these trailers was placed about that time with The J. G. Brill Company and for twenty-five trailer car bodies with the Laconia Car Company. The following article describes additional features and details of this car, and accompanying illustrations show interior and exterior views of the completed car.

GENERAL CONSTRUCTION

The weight of the new trailer car body is 15,900 lb. and its length is 48 ft. 2½ in. over anti-climbers. The all-steel underframe is composed of ⅛-in. pressed-steel crossings, side sills of 5-in. x 3-in. x ⅜-in. angles reinforced with 2-ft. 1¾-in. x 3/32-in. sheets, and end sills of 3-in. x 3-in. x ⅜-in. angles. The side posts are of 1½-in. x 2-in. x 3/16-in. x ¼-in. "T" construction. The side of the car is slightly tapered from window rail to eaves. The roof is of the wooden monitor-deck type and is equipped with seven Perry ventilators on each side.

CENTER-ENTRANCE ARRANGEMENT

A feature of the new trailer is the arrangement of the center-entrance section shown in an accompanying illustration. This section consits of a well extending across the car. The width of the well is the same as that of the door openings, 6 ft. 6 in., and its floor is 15 in. above the rail. A 10-in. step on each side of the well leads to a ramp, which has a rise of 4 in. in a length of

BOSTON CENTER-ENTRANCE TRAILER—EXTERIOR VIEW

BOSTON CENTER-ENTRANCE TRAILER—VIEW OF SLIDING DOORS AND CENTER-ENTRANCE WELL

4 ft. The well floor is equipped with Universal safety treads. The entrance to the well is guarded by two doors which slide open on runways located outside the car siding. The upper halves of the doors are slightly bent inward in conformity with the tapering car siding. The doors are controlled by an operating mechanism of the Consolidated Car Heating Company.

Both doors are operated by levers actuated by an air valve over the door entrance. The air valve will be mechanically controlled by the throwing of a handle on the conductor's stand which will be located in the center of the well. The closing of the doors will be automatically announced to the motorman by means of a signal light. A white-enameled stanchion is located at the center of the door opening for the assistance of boarding passengers, and a row of three vertical stanchions, joined together overhead by a transverse pipe, border each side of the well, as shown in the accompanying interior view. White-enameled grab handles are bracketed on each side of the door entrance. The entrance well will be arranged for prepayment operation.

INTERIOR EQUIPMENT

The seating capacity of the car provides for sixty-two persons. The end space used ordinarily for door entrances and exits or for the motorman's compartment is in this case utilized entirely for seating accommodations at both ends by means of a semicircular seven-passenger seat. In addition there are ten transverse and two longitudinal Brill "Winner" cherry slat seats on each side of the car. The cross-seats are 35⅛ in. long and are separated by an ample aisle space of 28½ in. Under the seats will be installed Consolidated heaters equipped with tilting heat deflectors for preventing the overheating of seats by deflecting the heated air to the rear of the seat. The upper deck has no headlining but the lower deck is lined with Agasote. The interior has a mahogany finish. Trimmings are of Aero metal. The curtains are of double-faced Pantasote material with Curtain Supply Company's curtain fixtures. The hand brakes are operated by a Pittsburgh drop handle installed close to one of the middle stanchions. The car is equipped with the Consolidated buzzer system.

BOSTON CENTER-ENTRANCE TRAILER—INTERIOR VIEW

EXTERIOR EQUIPMENT

The double-truck equipment is known as the Brill 53-F, which has a wheelbase of 5 ft. and 24-in. wheels. The size of the journal boxes is 3½ in. x 6½ in. Other exterior equipment includes Tomlinson Type A, form 8 couplers, Westinghouse air brakes and Keystone destination signs, installed on the letterboard over the center-entrance door.

The "Journal" at the Fair

Headquarters of This Paper at the Panama-Pacific Exposition in San Francisco

The headquarters of the ELECTRIC RAILWAY JOURNAL at the Panama-Pacific Exposition at San Francisco are in the Palace of Electricity, at the corner of Avenue C

HEADQUARTERS OF "ELECTRIC RAILWAY JOURNAL" AT EXPOSITION

and Second Street. The accompanying illustration shows the attractive booth which is occupied by this paper, in conjunction with the other papers published by the McGraw Publishing Company. The signs are illuminated by means of lino-lites, and the exhibit consists of bound copies of the papers for several years, with current copies and issues of the directories. There is also an exhibit of interesting views of important installations in the electric railway field and other fields covered by the McGraw papers, the views being thrown on a screen by means of a stereomotograph. These views have attracted a great deal of attention.

Readers of this paper are cordially invited to visit these headquarters when in San Francisco.

C. E. R. A. Meeting

Abstracts of Papers on Track Joining and Bonding, the Human Element in Electric Railway Operation, and Engineers and Public Service

The summer meeting of the Central Electric Railway Association was held on board the *S.S. City of Erie* on June 17 and 18 between Cleveland and Buffalo. Abstracts of three of the papers presented at the meeting follow. Owing to the fact that the meeting was held on the boat it was not possible to secure a report of the proceedings for this week. This, with an abstract of Mr. Allen's paper, will appear in a later issue.

TRACK JOINING AND BONDING

In a paper with this title E. C. Price, vice-president Indianapolis Switch & Frog Company, Springfield, Ohio, gave a review of the history of joint construction on interurban and city track as well as the methods of bonding the joint, pointing out the importance of a permanent joint, both electrically and mechanically. This, he said, is specially important in paved streets where any repairs or renewals of joints or bonds necessarily entail a heavy expense.

The speaker then reviewed the four types of welded joints put on the market: (1) The Lorain or spot welded joint, (2) the cast or molded joint, (3) the thermit joint, and (4) the Indianapolis arc welded joint which is made by welding a fillet of steel electrode around the periphery or edge of a pair of plates. According to the speaker, this process of applying is similar to joining one piece of fabric to another by sewing around the edge, which in arc welding of plates is accomplished without heating up the rail to the point of impairment, as heat is only generated under the point of the ¼-in. diameter electrode as it travels the edge of the plates, and the latter are so shaped and placed that no lines of welding are opposite, and thus tend to heat the rail through the opposite sides. This joint is applied with a small inexpensive outfit, known as the portable electric welder, requiring but one man to operate it. Any number of joints may be applied as economically as a quantity and under traffic conditions where necessary.

Efficiency tests of this joint show the conductivity and strength of the joint is from 100 per cent to 125 per cent compared with the unbroken rail. In a test for strength, two pieces of 7-in. T-rail, joined together with these welding plates, were subjected to a pressure of 30,000 lb. when supported on 2 ft. centers. This test resulted in curving the head of the rail and in stretching the base of the two plates, representing an area of 1½-in. thickness of metal, without impairing the welding fillet excepting for a distance of 2 in. or 3 in. at the point of elongation of the plates. Other tests have been made by removing the ties for a distance of 3 to 4 ft. each way from the joint, but, under traffic, less deflection was shown at the joint than within the rail proper.

The speaker, after then referring to some conductivity tests described in the paper read before the Iowa Street & Interurban Railway Association by F. V. Skelly, assistant superintendent Tri-City Railway & Light Company, and reported in the ELECTRIC RAILWAY JOURNAL for April 24, 1915, described the results of a test made by the Bureau of Standards in Washington. In this case the rail joint tested consisted of two sections of 7-in., 70-lb. T-rail, 2 ft. and 5 ft. in length respectively, joined together by two arc welded plates similar to plates 3391 and having approximately the following dimensions: Mean length 22½ in., width 4½ in., thickness ¾ in. The resistance of 3 ft. of joint and 3 ft. of adjacent rail was determined by measuring the drop across the respective sections with a Weston millivoltmeter while the rail carried approximately 300 amp. The results follow:

RESULT OF TEST	
Resistance of 3 ft. of joint	0.0000272 ohm
Resistance of 3 ft. of adjacent rail	0.0000376 ohm
Conductance of 3 ft. of joint in per cent of conductance of continuous rail equals 138 per cent.	
Resistance of rail per foot	0.0000125 ohm

In conclusion the author said in part:

"Many roads heretofore deprived of welded joints on account of quantity or cost are now installing this combined joint and bonding plate largely in the reclamation of old track and welding broken rails. For this purpose the manufacturers have designed what is known as the Apex type, reinforcing and supporting the head or tread side of girder or side bearing rails that have become weakened or split along the web. The Simplex type is similar but without the head support. This joint being of more recent origin than any other of the welded type is not as widely known. The plates, which are nominally ¾ in. thick, 30 in. in length at the base and 20 in. at the top with ends beveled, are fitted to the contour of the base of the rail and are temporarily bolted or clamped in position during the welding.

"The metal electrodes used are of special steel of the requisite resistance, melting point and content, which in combination, with contributed elements in the flux coating, insure a perfect, homogeneous weld, of maximum strength and free from blow-holes and impurities necessary to resist electrolytic and corrosive action. The arc is drawn between the electrode as the positive and both the edge of the plate and the rail as the negative, producing a cavity in the negative members which is filled in and built up by the molten electrode. The time required for welding a joint is from twenty to forty minutes, depending upon size of rail and traffic.

"The cost of welding a 9-in. girder rail, including the plates, welding steel, current and labor is given as from $3.50 to $5 per joint, varying with the type of plate used and conditions which applied. In new construction the rail ends should be either milled or slightly under cut to allow the heads to join closely together. In old track with open joints, a dutchman cut from a rail of the same section is inserted, completely filling the space between rail ends. These joints, as all others, should be ground to a perfect surface alignment after welding.

"The practice of welding the joint is no longer confined to the high sections but is now extensively used for all weights of rail, if bound in by paving or a surrounding roadbed and particularly if anchored to steel ties, and even without this provision in localities of even temperature.

"Expansion and contraction, if restrained, is said to produce a stress of 1000 lb. per square inch for each 7 deg. variation in temperature. This, under extremes, will be sufficient to cause failures at weak points in the continuous track either at or between the welds. Fail-

ures of this nature may be due to the quality of the rail or an impairment through welding, both of which may be prevented.

"From the foregoing it would appear that if the jointless track of perfect conductivity, the value of which is recognized, is of a permanent nature, eliminating joint and bond maintenance and materially reduce other items of upkeep, through maintaining high physical condition of the track, it will lead to the utmost universal adoption for city tracks, excepting at special work, where it is not practical.

"In the final analysis we find that the manufacturers have specialized and developed joint and bond materials, with the aid and co-operation of railway engineers, and that the progress has more than kept pace with increased requirements. Furthermore, it may be said that there is now a prevention as well as a cure for joint and bond disease."

HUMAN ELEMENT IN ELECTRIC RAILWAY OPERATION

BY H. C. DECAMP, REPRESENTATIVE OF THE WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, CINCINNATI, OHIO

Lack of education and training is the root of all evil represented by improper operation of cars, and explains the high cost of power per ton mile and excessive maintenance of equipment, overhead and track expenses. Since the first electric car was operated in Richmond, Va., it seems to have been the opinion of operating men that the position of motorman called for unskilled labor. This is probably caused by the fact that in the early days horse-car drivers or cable grip-men were used for that position, in an endeavor to keep the organization intact. It is true that it did not require much skill to operate cars in those days, as schedules were slow, cars light in weight and lacking in complicated equipments. The principle of operating a controller or hand brake is practically the same to-day as it was then—that is, in the motions taken to utilize these. Yet the art of operating electric cars has made as rapid advancements as any other feature in electric transportation, although this fact seems to have been overlooked by many operating officials in their haste to keep pace with improvements along other lines.

Betterment of the condition of the motorman in recent years has been forced, while other improvements have been for the most part made voluntarily, or as a matter of course in order to keep pace with events. The working conditions of traction employees to-day are ideal compared to what they were twenty-five years ago, but the responsibilities have increased in like proportion. The compensation paid is far greater than in the old days, but the companies are getting very little more for what they give. The fault must lie at the door of the management, for overlooking an opportunity to benefit by an educational course for the employees.

There are more opportunities for the education and training of men for any other position or trade than that of motorman. The American Association has made arrangements for a course of training for railway employees through a correspondence school, but nothing is said about the motorman. One cannot learn to be a motorman by correspondence, for it takes practical experience as well as practical demonstrations to train one properly for this position.

Owing to the fact that there never has been a general school of instruction for motormen, such as can be found for every other trade, it becomes necessary for each company to train its own employees before putting them in service. This is usually accomplished by placing the prospect under the guidance of a tutor, usually one of the oldest men in the service. If the applicant has had some experience in railroading he becomes familiar with the road in a short time and is instructed as to operation of controller and brakes. But who has instructed the instructor? Instead of improving conditions he may be teaching the new man in the old out-of-date way.

Some companies have the applicant, after he has been turned in by his instructor, placed in the shop for a stated time and thoroughly instructed in the equipments he will come in contact with. Please note the word "thoroughly," for there are men who have spent the regular time in the shop but did not gain much valuable information, owing to the fact that there were no regular shop instructors or predetermined course for them to follow, and they were left to shift for themselves. In such cases the applicant begins his work with a feeling that all he has to do is to get by the best he can. There are some electric railways which have educational courses, but they are in the minority.

Some time ago an article on instructions to motormen was drafted, and some of the member companies had it printed in pamphlet form and placed in the hands of their men. It was both surprising and gratifying to learn that the men as a whole took a deep interest in the subjects mentioned. When they found that some of the suggestions for the operation of their cars conflicted with their individual methods they willingly changed to the proper course. The majority had been following out their own way because they had not been instructed differently.

Most motormen are sadly lacking in the art of coasting with a corresponding saving in power, and this can be accounted for by their lack of knowledge of the expense to which the company is put to produce it. Coasting clocks and meters are being used in an endeavor to increase the amount of coasting, with marked success, but the men should be educated in the use of these instruments, as well as the method and the expense of producing power. Instructions to men in a body, with lantern slides or other illustrations, do very well in their way, but practical demonstrations on a car by a competent authority are of greater value. There are not many motormen in service to-day gifted with the art of judging weight, speed and distance. The practical demonstrations, therefore, can be used advantageously to convince them of the saving in power which can be accomplished by obtaining the maximum amount of coasting in any given run and under all conditions. By using a car for demonstrations, the proper method of accelerating, running and braking can also be shown to advantage.

Another very important point to consider is being prepared for emergency stops. A motorman, as a rule, runs his car every day in the same manner and all goes well. When something unexpectedly happens he has to decide instantly what to do, in his excitement he loses his head and invariably does the wrong thing. It is well to instruct the men what to do in each case so that they will always be prepared for emergencies. Preparedness on the part of the motorman may be the means of saving thousands of dollars in claims.

Some managers may say that it is not advisable to educate motormen, as it is unnecessary to make electrical engineers of them. Quite true, in some respects. The efficiency of a motorman may be classed as 80 per cent good judgment and common sense and 20 per cent knowledge of his equipment. Many may say that too much knowledge may lead to trouble on account of the men meddling with the equipment, but there are not many men who are looking to do another's work. They

do want to have sufficient knowledge of the apparatus to bring their cars into the shop if anything happens.

In all of the educational efforts expended to-day on the part of accident preventions, such subjects as the saving of power, reduction of maintenance and service to the public could be covered at the same time if a method of instruction had been mapped out which would show the men that their interests were being considered as well as the prevention of accident claims. In any organization, whether railroading or otherwise, it is essential to have every man in the organization satisfied with his position and a loyal booster. When the human element is in this condition of mind it is easy to bring about other reforms than accident prevention.

There is another unfortunate condition which exists in many railways—that is, a lack of co-operation between the operating and the mechanical departments. Of all departments these two above all others should work in harmony. The mechanical department working at a high state of efficiency and with modern appliances overhauls a car and sends it out for service as good as new. The operating department may place it in charge of an inexperienced man, and it is shortly turned in for control or motor trouble, or possibly for brakes, which is of course objectionable to the mechanical department. It is true that cars are turned in for imaginary troubles, but on the whole, the mechanical department should welcome information from the operating men. A motorman operating a car all day under service conditions, if he is a competent man, is usually in a better position to discover faults with the equipment than is the man in the shop.

In taking up the education of employees, companies should not lose sight of the fact that conditions surrounding the daily life of the men will have a great deal to do with winning the human side of the men to the methods of increasing their efficiency. Pleasant surroundings and various classes of concrete welfare work will be bound to have their effect upon the human element in the men.

The question of education for employees is of such importance it should be considered by the association as a whole for the influence such action would have on other companies. There are standardization committees on almost every subject in electric railway transportation, but little has been done in educational or welfare work, which without doubt presents the greatest opportunities for reforms in transportation problems.

ENGINEERS AND PUBLIC SERVICE

BY PROF. M. E. COOLEY, DEAN ENGINEERING DEPARTMENT UNIVERSITY OF MICHIGAN, ANN ARBOR

To-day lies in an engineering age. Modern civilization is an engineering product. Were the engineer's work to be stopped, civilization would stop. The engineer, having produced the structure of modern civilization, cannot now shirk the task of perpetuating it. The real work of the engineer is but now begun. Upon him devolves the task of making the country support the growth of population. This means increasing the food-bearing land, co-workers in other fields increasing its productiveness. It means bringing the food from remote districts to the point of consumption. It means many other things of a constructive character. But more than all, it means conserving the things now possessed.

The work which is now and in the future must be the engineer's, if the public is to be served most effectively, cannot be done at all without the support of his neighbor in other walks of life. To win this support, he must make his neighbor understand. Thus the engineer must become a teacher, an apostle, to preach the gospel of understanding to those who do not now realize the condition of things.

The conditions of the times are well represented by the quarrels between capital and labor, between the public service corporation and the public. The men in control of each and all of these great forces must be made to understand the facts and principles upon which their respective demands are based, and how far they can reasonably expect to have them satisfied. For example, railroad employees must be made to realize that omitting taxes and depreciation, one-half or more of the total operating expenses goes to them in wages. Thus, if there is a 10 per cent increase in wages, there is a 5 per cent increase in operating expenses. That much less is available for taxes, depreciation and support of the investment.

The state and federal commissions should be made to understand that there is a limit below which operative earnings cannot go if the demands of labor are to be met with increasing frequency and the property is to be maintained always in condition to render the service required. Where the two lines, decrease of earnings on the one hand and increase of expenses on the other, cross, or soon after, there must be a crash. To use a hydraulic term, there will no longer be any difference of head to turn the wheels.

The public service commission stands for the public. It is a splendid controlling force. Its motives are not to be impugned. Yet it needs the kind of information which engineers can furnish. Congress has recently made the acquirement of some of this information possible on the grandest scale ever undertaken. The valuation of railroads by a federal board has already begun. It is a stupendous task in its details, and still more stupendous in its possibilities of application. The engineering profession has a direct interest in the conduct of the work and its welfare. It should not stand aloof but interest itself now and until the last figure is made. Then will come the application of the results by the Interstate Commerce Commission to the problems of capital and rates to be allowed. Here again the engineer will have a teaching work to do. What elements of cost shall be considered proper for capital, and what factor shall make up the allowance out of earnings for operating expenses and maintenance of the property in a condition to render safely at all times the service demanded. These are new fields for most engineers, and before they can become teachers they must become students.

Engineers have so closely confined their attention to the details of their work as not to see very far beyond. It may be, and probably is, a result in large measure of the engineer's ability to center himself on specific things that the world has advanced so far in a multitude of directions. There must still be inventors, men content to devote a lifetime to the accomplishment of a single thing, specialists in the various fields. But engineering has widened its scope beyond the capacity of individuals. With this expansion there has grown the necessity of men trained in a broader way, not alone in engineering, but in all other walks of life.

The question must frequently arise in the future—whether it will or will not be wise to go to public ownership. Somebody should be able to give the true answer. The engineer is the natural man. His training fits him particularly for the necessary analysis of the problem, and upon his judgment the public must, or should, rely.

The conditions as between the public and the public service corporation have now become so serious as to involve more than individuals. There is a widespread

belief that the public service corporation has not been dealing fairly. This may have been true in the past and probably was in some cases; indeed, it may still be true, but nowhere nearly to the same extent. The mistake is now recognized, and the attitude of the utilities is for peace on favorable terms. The public, however, wants peace on its own terms. Right here the danger lies. The pendulum is likely to swing back too far, and in revenging itself the public is liable to cripple itself. That must be guarded against.

The importance of utilities to present civilization has been pointed out. Nearly $37,000,000,000 of private capital is invested in them. More will be needed as the country grows. Where will it come from? Certainly not from individuals when they understand the attitude of the public towards utilities. Capital will seek safer and more remunerative fields. The statistics of 1911 show that the net income of all utility corporations was $843,855,442. This is an average rate of return on all the capital of but 2.3 per cent. If the stocks, amounting to $19,329,023,135 be eliminated, there is but 4.85 per cent return on the $17,383,237,766 of bonds. No one will contend that the bonds alone represent the entire value of the property. Bonds are protected by a mortgage, and the mortgages are not given on full values. If it is assumed that the total value is represented by the bonds plus one-half the stock, the rate of return becomes 3.12 per cent on $27,047,749,333. Thus the average rate of return on utility investments is less than can be had in the savings banks. Why, then, does money flow into public utilities? Largely for the same reason that it flows into gold mines—namely, ignorance of the true conditions, particularly on the part of the small investor. The large investor is not usually found in the non-paying companies, except as he invested when the conditions were different and cannot now readily withdraw.

There are many things to be made clear to the general public before public service corporations can feel that cordial relations have been re-established. None is more important than an understanding of the real cost and value of utility property. One would expect this to be an engineering matter, but the courts have had a hand in laying down the rules for valuing property, and these must of course govern. Unfortunately the courts and the engineers have not always approached the problems in the same way or had the same point of view. Thus the engineer has often been obliged to sail a rather tortuous course in an effort to bring about what he believes is the right result of an appraisal of property. A problem already complex enough is thereby rendered more complex.

Another deplorable matter is the practice in this country of discounting the testimony of witnesses in hearings before commissions and courts. That is, the apparent necessity of having several engineers testify to the same set of facts. In England and in Canada, one engineer who has shown by his qualifications that he is competent to testify, is considered enough. But here, notwithstanding the array of engineering talent brought into court, the issues seem still to remain in doubt. This is particularly true in hearings before commissions relating to public service properties. The reasons appear to be that as far as the public is concerned the case has been prejudged, and no amount of controverting testimony can effect a change. Then, too, there is the feeling that engineers whose testimony is favorable to the corporation have been bought.

It behooves engineers, therefore, so to regulate their conduct that the people will have confidence in them. The engineer's capital is his reputation. He must not depreciate or destroy it. He must stand ready to serve the people with a loyalty commanding the respect and confidence of everyone. To do this most effectively he must, in addition to whatever specialty he may have in mind, rise above it and view his profession of engineering in a broader aspect. He must recognize that his duty as a citizen is even more important than as a specialist, and stand ready at all times to aid in the solution of public questions for which his training has so well fitted him.

As an illustration a recent action of an engineering society might be cited. In Detroit, where for years there has been a fight between the city and the street railway, the society sent the following communication to the Street Railway Commission: "In view of the fact that many of the problems that you have under consideration are largely engineering problems, especially those pertaining to valuation of existing railway property and to the study and planning of radical improvements of Detroit's transit facilities—we, of the Detroit Engineering Society, respectfully offer you our most cordial co-operation both as engineers and as citizens of Detroit." It is pleasing to add that this offer was accepted. Another instance of recent date is the action of the Western Society of Engineers in outlining the proper relations to be followed with engineering advisers.[1]

Harold Albert in a recent paper read before the Western Society of Engineers discussed in cogent language the engineer as a student of public relations. He said that upon the engineer rests the responsibility, and with him lies the capacity, to render the largest public service possible in setting the lawmakers' and the consumers' fears of excessive profits at rest, and also aiding in securing the right for the public utility to earn a fair return, all hazards considered.

These are a few out of many examples to illustrate what is meant by the engineer in the service of the public, or engineering in a broader aspect. Every true American must do his part in the work of general betterment, but to the engineer falls the task of explaining many things of an engineering nature which the citizen uses and does not understand. The one great obstacle to present welfare is ignorance—ignorance of things based on engineering and economics. Engineering in its broadest sense may include the latter. The engineer in the service of the public must as speedily as possible be made to understand that there are other things than mere material things to plan and execute. He should enlarge his horizon, look out upon the world, and try to comprehend the problems waiting to be solved. He should as a first requisite acquire a broad knowledge of the complex man of to-day.

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[1]WHEREAS, The president of the Sanitary District of Chicago appointed a commission early in 1912 to investigate and report, among other matters, on the water power development of the Sanitary District, which report, after careful investigation, has recently been made public; and

WHEREAS, Certain members of the Sanitary District, the City Council of Chicago, and the daily free press have poured out a torrent of fretful rebuke and personal insinuation against the individual members of the commission, all apparently because the facts and conclusions of said report were not what had been expected;

Therefore be it resolved—that this society views with regret this public attempt to abuse men who were apparently trying to do their duty to the public in setting forth facts as they found them and testifying to the truth as they saw it, and the society would point out for the benefit of the public officials, who have been conspicuous in this controversy, the following proper relations with engineering advisers, which it wishes to emphasize at this time, as a matter which vitally affects the public welfare:

(1) That an engineer's first duty to his client is to tell him the truth, no matter where it may lead, or how unpalatable it may be.

(2) That engineering and engineering economics are subject to natural law, which cannot be altered to suit the whims of human nature.

(3) That the most serious disgrace that comes to an engineer is to conceal, prevent, or distort natural and economic law, either to please a client or temporarily advance his own interests, and so ultimately lead his client into difficulties.

(4) That an experienced engineer of standing ranks as a confidential professional adviser, feeling keenly his responsibilities, and whose integrity and conscientiousness, when properly established, should be appreciated and upheld by his client.

(5) That engineers, while not infallible, or superhuman, are more apt than laymen to be right in their findings on engineering facts and economic truth connected with engineering matters.

Organizing the Traffic Survey

General Discussion of Type of Man, Organization and Supervision to Be Employed in Traffic Surveys—Work Mapped Out for Large, Medium and Small Companies

BY F. W. DOOLITTLE, DIRECTOR BUREAU OF FARE RESEARCH, AMERICAN ELECTRIC RAILWAY ASSOCIATION

Although the development of extensive traffic studies has been relatively recent, various companies in order to judge of operating efficiency have for many years prepared certain traffic statistics. At first such data were usually taken from conductors' trip reports and confined to the determination of the number of passengers carried throughout the day and to the number of cars provided for their accommodation, with particular reference to the occurrence of heavy loads and the profitable use of trippers. The figures so obtained were variously plotted and analyzed.

A description of a method used in 1901 on the New Orleans & Carrollton Railroad, where it was introduced by George H. Davis, former manager of the road, now of the firm of Ford, Bacon & Davis, was published in the STREET RAILWAY REVIEW of Sept. 15, 1901, in an article by A. H. Ford, now general manager of the Cumberland County Power & Light Company. Since that time, however, necessity for greater and greater detail has arisen, and to meet this more extensive traffic studies have been made.

No attempt will be made here to pass on the value of these traffic studies, but it will be worth while to examine later the details of some of them as showing what practice has been and is. In this article the topic will be the organization of a traffic survey. It is well agreed that the type of man and organization to be employed in such a survey is of vital importance to its success. In the following paragraphs especial attention will be paid to the details of organization.

FUNCTION OF THE TRAFFIC SURVEY ORGANIZATION

The function of the traffic survey organization is the collection and the compilation of information concerning traffic characteristics which it is necessary for the officers in charge of operation to have in order that the maximum operating efficiency may be reached. That organization is best which permits the collection of the maximum amount of pertinent and reliable data at a minimum cost.

There are three distinct classes of work in making traffic surveys:

(a) The collection of data by observation in the field.

(b) The compilation and tabulation of field data in the office.

(c) The supervision of this work (a and b) and the study of results.

Based on these studies is the construction of time-tables, and it would be of advantage in many cases to place the working out of schedules under the man who directs and supervises the making of traffic studies, and who analyzes their results. When this is done, there should be added a fourth division of the work:

(d) Construction of time-tables.

Before discussing further the general features of the organization and the supervision of the work, it will be well to examine both the purpose and the nature of the work to be done in the field and in the office.

FIELD AND OFFICE WORK

The extent of the data required and the frequency of their collection present problems which will receive more extended attention later. Here it is pertinent to note that the field data to be recorded will consist of such items as the number of passengers boarding or leaving a car at certain points, the number of seated passengers on the car, the number standing, the time at which the car passes certain points, the condition of street traffic, the types of passengers, classified as to occupation, and other similar information. All items must be neatly and accurately recorded and turned in to the office in such shape as to facilitate their combination with similar records taken by other observers.

Although there is substantial agreement as to the duties of observers, there is some disagreement among traffic experts as to who these field men should be—conductors on regular duty, conductors especially assigned to the work, or inspectors and special agents drawn from other departments or not previously connected with the company. The 1910 report of the committee on construction of schedules and time-tables of the Street and Interurban Railway Association shows[1] that out of thirty-eight companies reporting on the matter, twenty-four used inspectors, twelve used conductors, and two used special agents. In the discussion that followed this report it was brought out (three to one) that conductors' reports were uniformly unreliable and that inspectors were far more efficient.

If it could be done without sacrificing efficiency, it would be economical to have observations made and data recorded by the conductor on duty with each car. Experience with this method of procedure, however, has been generally unsatisfactory in city operation. Bion J. Arnold, in his San Francisco survey made in 1912, reached the conclusion that a traffic study based on conductors' reports is unreliable[2]. Yet it might be noted that conditions of interurban operation permit conductors to devote more time to recording traffic statistics than those prevailing on city lines, and that results under these conditions are reliable[3].

A. M. Taylor, director of the Department of City Transit, Philadelphia, in reporting the Philadelphia traffic survey of November, 1912[4], speaks of the great accuracy of the results as being caused by the

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[1] 1910 Proceedings of the Transportation and Traffic Association of the American Electric Railway Association.—p. 256 a.

[2] San Francisco Transportation Problem, December, 1912. Report on Traffic and Service.

"To make results, as many as five observers were stationed on the non-prepayment cars. . . . These counts showed the following missed fares or passengers missed by the conductor on a single trip:

"One line was ninety passengers short.

"Four lines were fifty passengers short.

"Eight lines were twenty-five passengers short.

"Thirteen lines were ten passengers short.

"In one case . . . during a typical rush-hour period, 38 per cent of the total registration was missed on a single car trip. In comparison therewith, only two prepayment lines showed ten passengers or over missed by the conductor, the average being four or five. In these two cases, the excessive crowding on the rear platform (against the company rules) prevented the conductor from reaching the passengers clinging to the rear step."

[3] Howard F. Fritch, in ELECTRIC RAILWAY JOURNAL, Sept. 21, 1912, comments as follows:

"Passenger counts are taken both by inspectors on the street and by conductors. The conductors take the counts most frequently. Not only have very good results been obtained from counts taken in this manner but it is much more economical, as a large force of inspectors would have to be employed to take counts over so large a territory as is covered by the Bay State Street Railway, while a large number of counts can be taken by the conductors at one time with practically no additional expense."

[4] "The Solution of a City's Transit Problem."—*Electric Journal*, October, 1914, page 518.

employment as checkers of experienced conductors borrowed for the purpose from the Philadelphia Rapid Transit Company. These conductors did not have charge of the cars but confined their attention to the collection of traffic data. In 1909, Stone & Webster[5] in making a traffic count on the Metropolitan Street Railway lines in New York City resorted to the same expedient, namely, borrowed a number of experienced conductors from the company and used them as checkers. It must be borne in mind, however, that the purposes of both these studies and the extent of the data recorded were such that sufficient accuracy could be obtained only by men extremely familiar with local conditions.

Efficiency is developed by instructions as well as by experience and practice[6], and whether conductors undertake the work in addition to their regular duties or devote their whole time to recording traffic data, or whoever the field men may be, it is considered good practice to give the men taking the data thorough instructions in methods best calculated to insure accurate results. Bound pocket books ruled into columns with proper headings or printed cards should be provided for the recording of all data, and frequent checks should be made of the accuracy[7] of the record.

The office force has as its duties the assembling and the analysis of the data collected by the observers and the preparation of information for use in constructing time-tables. It may also be called upon to prepare special information of various sorts for various other departments. Questions of routing, transfers, extensions, time of loading under different conditions, effect of changing social and business conditions, etc., are subjects on which the traffic survey department may make reports. The office force should be recruited from those in other departments which have shown an aptitude in grasping the significance of figures. There will be drafting to be done, but this will be largely the construction of curves and for that reason will not require great technical proficiency.

SUPERVISION

Whether the traffic survey is carried on under the superintendent of transportation, with the work done by regular conductors and clerks from his office, or is placed in a separate department whose director reports to the manager or superintendent of transportation, will of necessity depend many times on the size of the company and on the distribution of other duties among the officers and departments. It is of interest that the chief engineers of two state railroad commissions have recommended very strongly the establishment of separate and distinct organizations wherever possible for the collection and analysis of traffic data[8].

In this connection the ELECTRIC RAILWAY JOURNAL of April 25, 1914, reports the Pittsburgh Railways as having maintained for some years past a department of traffic statistics composed of divisions dealing with:

(a) Routing and time-table.
(b) Traffic counts.
(c) Dispatching.
(d) Publicity.

In outlining the transportation department of the Metropolitan Street Railway, New York, the ELECTRIC RAILWAY JOURNAL of June 25, 1910, states that a distinct time-table and statistical bureau is maintained in the department under the supervision of the superintendent of transportation. This bureau is under the immediate control of a chief who is aided in the work by a force of clerks and stenographers, tallymen and time-table makers.

Another article in the ELECTRIC RAILWAY JOURNAL of Sept. 21, 1912, by Howard F. Fritch of the Bay State Street Railway time-table department, describes that organization and its work. The department was originated in June, 1910, under Prof. A. S. Richey as superintendent of transportation. Its duties are as follows:

(a) To make investigations of traffic.
(b) To keep graphical records.
(c) To make time-tables for the entire system of 938 miles of track.

The preceding discussion of the organization of a department of traffic studies brings out certain general principles which have been deemed of value in the past and which it may be worth while to emphasize further and summarize at the same time.

As regards the type of man and organization to be employed on the work, it may be said that a separate, distinct, permanent traffic study department, under the sole and responsible direction of a first-class trained man with initiative and executive ability, may well be established by many companies. The subordinates of this organization should be intelligent, accurate, well-instructed, and properly aided and supervised men, and the personnel of the department should be kept separate and distinct from all others. Yet while this would insure the maximum of efficiency and results which would be of the best in accuracy and completeness, it is manifestly not practicable in all cases, and for the smaller companies would be out of the question. A simplified organization for these companies is to be desired and the following is recommended:

For present purposes, companies will be classified as large, medium and small, but no attempt can be made

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[5]Stone & Webster's *Public Service*, March, 1913.

[6]Speaking in general of the efficiency of inspectors, R. W. Harris, electrical engineer and traffic expert, says in "A Method for Determining the Adequacy of an Electric Railway System"—American Institute of Electrical Engineers, Proceedings for 1910:—

"At first glance it might seem that the amount of data to be taken of each car going in one direction is more than could be expected without sacrificing accuracy, and especially when the time spacing of cars is often as short as ten seconds; this feature, however, is overcome by practice in making observations. As a matter of fact, the inspectors became so efficient that the data were found to be 95 per cent accurate by test, which is sufficiently close for this class of work."

[7]R. M. Feustel, chief engineer State Public Utilities Commission of Illinois, who made the recent Winnipeg (Canada) traffic survey, says in the Public Utilities Commission of Manitoba 1913 Report:—

"Inspectors chosen were intelligent, accurate workers. The notes taken were entered into books in a form previously prepared and each man was provided with a watch, so that all records were accurately taken and uniformly listed. The inspectors were checked two or three times each day, both by chief inspector and myself, to see that the notes were accurate, and each man was carefully instructed in the work."

[8]C. M. Larson, chief engineer Wisconsin Railroad Commission, in an article in *Municipal Engineering*, February, 1914, says:

"If the system is of considerable size a traffic study department should be established, under the direction of either the manager or the operating officer. If the system is small this officer may himself have direct charge of the details of the work, provided he is thoroughly familiar with the nature and scope of the investigation to be made. This department should not be a spasmodic affair dependent for its existence upon a shortage of work in some other department. It should be permanent and should be prepared to supply to the manager or operating department reliable information on traffic conditions for any season, day or hour, and upon any point of every line. In whatever way this is done (data collected), the collection should be under the direction of the head of the traffic study department in order that the results may be consistent and trustworthy."

E. Swenson, chief engineer, Pennsylvania Railroad Commission in Case No. 87, 1910, Report on Pittsburgh Railways, says:

"Establish a central organization . . . which shall be in full control of securing all the data of the movement of population from and to the many centers of population, and all other traffic data in this territory . . . The personnel of this department shall be kept separate and distinct from that which takes care of the operatives and their interests. It should be composed of the following bureaus: Traffic; routing and scheduling; dispatching and checking, and publicity. The first two and the fourth bureaus, the duties of which do not in any way pertain to the operatives, their time, etc., shall have a personnel composed solely of first-class, technically trained men and that of the very best talent, as the efficient and profitable service depends largely upon their data and deduction."

to define any more closely the limits of these classes by reference to annual revenue, car-miles or other operating statistics. It may very well be that, because of peculiar conditions surrounding the operation of a property, this classification will place it in a group where it would not naturally fall under a classification based on operating data.

It is recommended that large companies establish permanent departments for the purpose of traffic study under the superintendent of transportation, but directly in charge of a chief of a bureau of traffic statistics, who will devote his entire time to this work. Under him there should be two general classes of employees, inspectors or field men, and clerks and draftsmen, who will compile and analyze the data furnished by the inspectors and prepare them for use in the construction of time-tables.

For companies of medium size, it is desirable that there be made regular and continuous studies under the direction of the superintendent of transportation, and that there be used for the work, as inspectors, in addition to the employees regularly engaged in the supervision of loading, headways, schedules, etc., conductors and clerks from the office of the superintendent of transportation. These men will naturally be in closer touch with such types of information as it is desired to compile than men in other branches of the service. The information secured should be worked up by the regular office force of the superintendent of transportation.

In the small companies, only occasional studies will be made, and these should be made under the direction of the manager by men from various offices. In so far as the collection of data is concerned, the older and more experienced conductors should be used.

Regardless of the size of the company and the detail in which the information is desired, the purpose of the traffic studies will be to enable the company to reach two results: (1) That the maximum service which it is possible to render for the fare paid shall be offered, and (2) that as great a saving as possible in car-miles shall be made. The problem becomes that of making car-miles coincide both as to time and place with passenger-miles.

In a later article the extent and the frequency of the collection of data necessary under different conditions will be discussed.

The C. E. R. A. Boat Trip

A telegraphic dispatch sent from Buffalo Friday morning reported that the Steamship *City of Erie*, carrying the members of the Central Electric Railway Association, their families and guests reached Buffalo safely on Friday morning. About 225 persons participated in the trip.

The meeting of the executive committee of the association was held Thursday morning and the technical session in the afternoon. President Henry presided and S. W. Greenland, Fort Wayne, presented the report of the committee on uniform charges for repairs to foreign equipment. Four new members were elected, and amendments to the constitution and by-laws, making steam and water transportation lines eligible for membership and making the office of secretary and treasurer an appointive one were passed. The four technical papers on the program were presented, but there was no discussion. President C. Loomis Allen of the American Electric Railway Association addressed the members and spoke of the importance of the company section movement. He also expressed the hope that the association would so amend its constitution as to admit all railway employees to membership at lower rates.

Two special cars from Indianapolis, one by way of Columbus, and the other by the way of Fort Wayne brought a number of members to Cleveland on their way to the boat. Those who traveled by way of Columbus stopped at the Mansfield Country Club where the Ohio Brass Company tendered a banquet to them.

Conference on the National Electrical Safety Code

As has been announced in the Electric Railway Journal from time to time, the national bureau of standards had scheduled a general conference on the proposed national electrical safety code to be held in Washington on July 1 and 2. At this conference the railway association was to have been represented by W. J. Harvie, Syracuse, N. Y.; A. S. Richey, Worcester, Mass., and C. L. Cadle, Rochester, N. Y. In order to allow more time for the study of the proposed code, which is now available in pamphlet form, the conference has been postponed to Oct. 27.

The code circulars can be obtained from the superintendent of documents, Government Printing Office, Washington, D. C. The prices are: No. 49, operating rules, 10 cents; No. 54, construction rules, 25 cents.

N. E. L. A. Convention

List of Officers Elected and Brief Abstract of Secretary's Report Are Given

Supplementing the extended abstract of the proceedings of the annual convention of the National Electric Light Association held in San Francisco, June 8 to 11, printed in last week's issue, the following items covering occurrences too late for that issue are given.

The elections to offices and the executive committee resulted thus: E. W. Lloyd, Chicago, Ill., president; H. A. Wagner, Baltimore, Md., first vice-president; W. F. Wells, Brooklyn, N. Y., second vice-president; R. H. Ballard, Los Angeles, Cal., third vice-president; R. S. Orr, Pittsburgh, Pa., fourth vice-president; W. H. Atkins, Boston, Mass., treasurer; W. H. Blood, Jr., Boston, Mass., insurance expert; T. C. Martin, New York, N. Y., secretary; Harriet Billings, New York, N. Y., assistant secretary and assistant treasurer; J. E. Davidson, Portland, Ore.; H. C. Abell, New York, N. Y.; H. C. Bradlee, Boston, Mass., and R. F. Pack, Minneapolis, Minn., executive committee members.

In his annual report T. C. Martin described the large volume of business conducted in the headquarters office. During the year 150,000 copies of the association *Bulletin* were issued, an average of more than 13,000 for the eleven months of publication. The effort has been maintained to build this up into a publication of magazine character without encroaching upon the legitimate field of the technical magazines. The activities of the vigorous and aggressive commercial section have been expanded greatly, and it has now taken over the publication of *Rate Research*, and has also taken a further most important step in the creation and organization of its educational course. The organization of the accounting section marks the apparent increasing tendency in the association to differentiate into group work, which may lead in time to the reconstruction of the old hydroelectric section or its merger into a broad technical section. The lecture bureau has a working list of thirty-five lectures, most of which are illustrated. During 1914 the lectures were delivered before 40,000 persons. The association, also, has on file rate information from practically all member companies, and has sought to develop and maintain friendly interchange relations with all the public service commissions.

Master Car Builders' Convention

At the Annual Meeting at Atlantic City, June 14-16, Car Construction, Draft Equipment, Brakeshoes, Impacts between Moving Cars, and Couplers Were Among the Subjects Discussed

At the forty-ninth annual convention of the Master Car Builders' Association, which was held at Atlantic City June 14-16, a large part of the discussion centered on the general subject of the increased buffing and pulling strains to which modern freight cars were subjected. This was evidenced by the extended reports made by the committees on car construction, couplers, and draft equipment.

With regard to passenger equipment, however, an important recommendation was made to the effect that a dimension of 51 in. be established as the standard height above rail for the top of the platform buffer. The committee on car construction also took up an important subject in submitting, tentatively, complete designs for a standard M. C. B. box car, the idea being that the members of the association should study the drawings and submit suggestions for modifications by Dec. 1, 1915. The proposed design, it may be said, is of the steel-sheathed type, the inside length being 40 ft. 6 in.

In its report also this committee stated that a large number of failures can be attributed to improper center-sill construction and that it had therefore formulated some rules based on fundamental principles and comparable with the strength of other parts of the car. Many roads are at present modifying wooden cars, making it desirable to have a guide for minimum strength requirements for reinforcement of existing wooden cars to fit them for some years' further service. For such cars the following rules are submitted:

The draft attachments, including draft arms, if used, must be of metal and may be of either integral or riveted construction. The strength value of the draft attachments and center-sill construction must be equivalent to at least 10 sq. in. of steel in tension and compression, 6¼ sq. in. of rivet-bearing area, and 12½ sq. in. in shear. The ratio of unit stress to end load must not exceed 0.15. Metal draft arms applied to wooden center sills must extend at least 30 in. beyond center line of bolster, toward center of car, must be securely fastened to bolster and center sills, and where possible should butt against compression members placed between draft arms and needle beams and also between the needle beams.

Hardwood or yellow pine center sills may be considered equivalent to steel in center-sill construction between bolsters, if they have four times the specified unit values, namely, 40 sq. in. tension and compression area, and a ratio of unit stress to end load not exceeding 0.0375. Where wooden members are reinforced with metal (composite construction) either the steel or the wood alone must meet the strength requirements.

Draft Equipment

The committee on draft equipment submitted a tabulation made up from replies received to twenty questions sent out in a circular of inquiry for the purpose of finding out general practice and the weaknesses of the present draft gear appliances. The great majority of replies stated that the wooden cars were being equipped with higher-capacity draft rigging, the general practice being the application of metal draft arms and steel sills. Sixty per cent of the total number of cars were of steel center sill construction, and 65 per cent of these were equipped with friction draft gear ranging in capacity from a minimum of 100,000 lb. to a maximum of 260,000 lb. The capacity of these cars varies from 80,000 lb. to 120,000 lb. It is evident that a draft gear of low capacity necessitates a better construction of car in order to take care of the shocks, which are meant to be absorbed by the gear.

Eighty per cent of the total replies show preference for a friction draft gear on new equipment. Thirty-six per cent express a preference for more coupler travel than the present standard of 2¾ in. between coupler horn and striking plate. The matter of keeping up nuts on drawbar carry-iron bolts is a great source of trouble. Almost all who advise no trouble in that respect are using nut locks, while some of the largest roads are overcoming this trouble by placing these bolts in shear instead of in tension, as has been the general practice. Keys are preferred to rivets in the coupler yokes by an overwhelming majority.

Brakeshoes

In its report the committee on brakeshoe and brake-beam equipment submitted a résumé of the tests so far made on brakeshoes for the years 1906 to 1914, inclusive. During this time, a considerable number of brakeshoes of differing materials and construction have been tested on the Master Car Builders' machine at Purdue University, and it has become apparent that the coefficient of friction diminishes as the pressure on the shoe is increased, but between the pressures of 12,000 lb. and 18,000 lb. the change in coefficient is slight. It is furthermore apparent that pressures in excess of 18,000 lb. are not economical.

The coefficient of friction at high speeds is very much less than at moderate speeds, the average coefficient at 80 m.p.h. being less than 10 per cent or less than one-half the corresponding average at 40 m.p.h. The coefficient of friction of filled or composition shoes is, in all cases, considerably greater than the average, being from 50 per cent to 100 per cent in excess of that for cast-iron shoes.

General conclusions cannot safely be drawn as to the effect of speed and pressure on the loss of weight, except that pressures in excess of 18,000 lb. cause an abnormal loss. The tendency, however, is for the loss in weight to increase as the pressure and the speed increase.

Clasp Brakes for Passenger Cars

The committee on train-brake and signal equipment stated that, to date, there are in service about 2500 sets of clasp brakees in use for modern passenger car equipment on about a dozen leading railroads of the country. So far as the committee has been able to learn, this type of rigging is maintaining its claims for reduced brakeshoe wear per given number of foot-pounds of brake work done, for reduced number of hot journals in so far as the brake may be responsible for them, for smoother riding of car during time of brake action and for a remarkably low cost of maintenance both with respect to the parts of the rigging itself and to the cost of brakeshoe renewal. The stopping efficiency is about 20 per cent greater than the single shoe arrangement. It appears that where the wheel load is approximately 12,000 lb., clasp brakes should be used. The committee recommends, therefore, that clasp brakes be applied to all four-wheel truck passenger cars weigh-

ing 96,000 lb. or more, and to all six-wheel passenger cars weighing 136,000 lb. or more.

Impact between Moving Cars

An individual paper on impact between freight cars in switching service, presented by Louis E. Endsley, included the results of tests made with a chronograph having a cylinder revolving at a speed of 45 r.p.m. and a marking needle that was attached to the car whose movement was to be registered. As the cylinder was 20 in. in circumference, this gave a speed for the paper on the cylinder of approximately 15 in. per second. In the test, eight or ten cars in a string were placed on a track that had just sufficient grade to keep a car in motion after it had been started but not enough to accelerate the car. The brakes on the last two cars on the down-grade end were set, and a locomotive was coupled on to the up-grade end and the slack was pushed in until only the draft-gear movement was left between each pair of cars. The end car was then disconnected and pulled up the track some distance, the chronograph having been connected to the end car of those standing. The motor was then started and the drum allowed to revolve. The car that the engine had pulled up the track was allowed to drift into the string of stationary cars, the speed being determined by stop watches, and the velocity and acceleration of the first standing car were obtained from the record made on the cylinder of the chronograph.

The tests were made on the Norfolk & Western 90-ton cars and the Pennsylvania 55-ton cars, both kind of cars being tested light and loaded. For the purpose of distinguishing the different cars, the moving car was called "A," the first car of those standing "B," the second standing car "C," the third standing car "D," etc. The instrument was connected to Car "B," which was the first car in the cut of standing cars. In each case the weight of the car and load was known, and the acceleration was determined from the curve drawn on the drum. The weight of the trucks included in the weight of the car, as the maximum force occurred after the car had moved approximately ¾ in., and the trucks must have been in motion by that time.

The following table gives the results obtained:

Weight of Car in Pounds	Velocity of Car "A" in Ft. per Sec.	Speed of Car "A" in m.p.h. at Impact	Maximum Velocity of Car "B" in Ft. per Sec.	Maximum Pressure in Pounds
48,000	1.35	0.92	0.67	12,600
48,000	3.57	2.43	1.64	41,500
48,000	5.00	3.41	2.48	90,600
48,000	8.12	5.54	3.30	158,500
60,000	3.26	2.22	1.25	101,000
60,000	5.00	3.41	2.37	128,800
60,000	8.83	6.02	4.94	468,000
143,300	2.75	1.87	1.75	119,100
143,300	3.45	2.35	2.04	167,000
143,300	5.36	3.65	3.26	453,000
143,300	6.98	4.76	3.82	640,000
248,000	2.46	1.68	0.59	110,000
248,000	3.49	2.38	1.69	263,000
248,000	4.76	3.25	1.80	530,000
248,000	5.65	3.85	2.65	655,000

The loss of kinetic energy in some cases amounted to as much as 70,000 ft.-lb. This can only be accounted for by the destruction of some part of the car. During the testing on the 90-ton cars a few impacts were made with bumper blocks installed. A larger percentage of the kinetic energy was transmitted to Car "B" when the bumper blocks were used. Also the force of impact between the cars was usually somewhat greater. This, no doubt, is accounted for by the fact that the load is distributed over three points and thus a greater force was produced with less destruction than when the couplers and draft-gear connection received all the load. The maximum force of impact for any given speed is almost directly proportional to the weight of the two cars in impact.

An interesting thing, plainly shown from the curves made on the chronograph, was the fact that the maximum force on Car "B" occurred always before it had moved 1 in. although Car "B" usually moved a total distance of from 4 in. to 12 in. Therefore, the maximum force on Car "B" occurred before any appreciable force was exerted between Cars "B" and "C," and the speed of Car "B" was very slow before Cars "C" and "D" had any pressure between them. Car "B" was always stopped before the impact between Cars "D" and "E" occurred. The largest percentage of kinetic energy is taken out of the moving car in the impact between Cars "A" and "B," and the greatest damage would be done at this point. As the greatest force occurred before Car "B" had moved 1 in., the damage to the end of the car would be just as great if only one car was standing as if a dozen were backing it up, provided there was at least 1 in. slack between the first and second cars of those standing. Of course, as regards damage to the center sills at the center of the car, no doubt this damage would be greater if the cars were backed up by other cars. But the results given in this paper seem to indicate that there would be just as great an impact between the cars if one car struck a single car or struck a string of cars.

Couplers

The standing committee on couplers, which has had under consideration the development of a single standard design, presented in detail the result of the extended tests made during the past year. A number of the experimental couplers of both "A" and "B" type were tried out in service, others being submitted to static strength and endurance tests, and the results showed the experimental types to be satisfactory.

The opinion has been voiced, although no specific objection has been made, that the weight of the experimental type is too great. However, the objections that have been raised are apparently commercial and are based on the increased cost due to the increased weight rather than to any definite mechanical features. The experimental standard couplers were planned originally to withstand a static pull of 200,000 lb. without exceeding the elastic limit, and the coupler head and other parts were designed to conform to this load, making the knuckle the weakest part of the coupler, as it should be. After developing the design it was found that the 200,000-lb. requirement could not be obtained with a height of head that would go under passenger-car buffer. Limiting dimensions were placed upon the height of the head and these reduced the strength to 175,000 lb. without permanent set, establishing a coupler weighing approximately 400 lb. This gave a 33 per cent increase in weight with a 100 per cent increase in strength over existing designs.

Attention was called to the desirability of designing any new equipment to accommodate the proposed new design of coupler. It has been found that a 6-in. x 8-in. shank is essential, and therefor provision should be made for this so that the new standard couplers can be applied when the design is finally adopted.

As a result of the investigation and tests during the year the manufacturers of the "A" and "B" experimental couplers are to make final changes in the designs, and they have submitted models of these changes, which, however, do not alter the general principles of the coupler in any way. Therefore it has been decided to designate the modified "A" coupler as "C," and the modified "B" coupler as "D" in order to avoid any confusion in the tests and records. It is expected that the committee will be in position to make final recommendations as to the selection of either the "C" or the "D" type as a standard at the 1916 convention.

Chicago's Two-Day Strike

Mayor Thompson's Efforts for Arbitration Succeed, Despite the Stolid Refusal of the Men at First to Accept Arbitration as a Means of Adjusting Wage-Scale Differences

A two-day strike, involving the acceptance of the principle of arbitration as a means of settling the new working agreement between the Chicago Surface Lines, the Elevated Railroads of Chicago and their employees, has been won by the railway companies. The managements of the two companies felt that they owed it not only to Chicago but to the whole country to stand by the principle of arbitration, particularly when the employees refused to consider offers which were clearly so just. Preliminary negotiations leading up to this strike included at first a number of conferences between the representatives of the employees and President Britton I. Budd, of the Elevated Railways, and President Leonard A. Busby, of the Surface Lines. From these resulted a satisfactory adjustment of working conditions, but when the employees refused to consider any offer of increased wages short of their demand for a 33-cent minimum and a 36-cent maximum, negotiations ended.

In former wage controversies one of the principal points at issue has been a graduated scale. This question was raised by the employees in their demands this year, and accordingly both the elevated and the surface lines offered to raise the wages of the lower-grade men but not to increase the maximum wage of 32 cents an hour. In taking this stand the Chicago Surface Lines held that 60 per cent of the trainmen were receiving the maximum wage which gave them average yearly earnings of approximately $1,000. That this was deemed sufficient to make train service highly desirable employment was shown by the number of applications received. In making this offer on June 9, the company agreed, if the proposition was not satisfactory, to arbitrate the entire question.

On the same day the men declined the company's offer, refused to arbitrate and issued an ultimatum to the effect that unless the company made what they considered a fair proposition within forty-eight hours the men would be called out. In regard to the usual form of arbitration the representatives of the employees stated:

"From the experience we have had with your usual way of settling questions of this kind, either in the State Legislature or in the City Council, we can assure you that we want no repetition and the usual way you proposed will not be accepted. In refusing your proposition we wish you to bear in mind that the refusal is not the act of any man or individual, or a committee of officials, but is the act of the whole organization. We, therefore, wish to inform you that acting in full concert and with authority vested in us by our membership, every proposition in your communication has been rejected."

In response the company again offered arbitration and pointed out that the men and the company were apparently unable to agree upon what was a fair proposition. Accordingly this question was put to the employees: "Who is to determine what is a fair proposition after the parties, in the course of their negotiations, have failed to agree?" On June 10, in replying to this question, the employees declined to consider arbitration. They said: "We must remain the judges of what constitutes a fair proposition concerning wages." At this point both the surface and elevated railways dropped further negotiations and Mayor Thompson endeavored to bring about a settlement. Through his efforts the time of beginning the strike was delayed until President W. D. Mahon, of the Amalgamated Association, could be summoned from Detroit. Mr. Mahon arrived on the morning of June 11 and conferred with representatives of the union and the Mayor, but the men declined to consider arbitration as a basis of settlement. Conferences continued all through Friday and part of Saturday, and at 7:30 p.m. Saturday evening the so-called form of arbitration was submitted to the Mayor. The basis of this proposition, as stated in the letter accompanying it, was to safeguard the arbitration in such a way as to secure an impartial result. In the employees' plan, under the heading of points conditional to arbitration, were included demands which meant an increase in wages of approximately $1,500,000. These conditions were set forth as follows:

EMPLOYEES' DEMANDS ON JUNE 12

"First—Conditional to arbitration, mutual agreement that:

"(*a*) Runs arranged so that 50 per cent be straight runs and 50 per cent be completed within fourteen consecutive hours.

"(*b*) Graded wage scale limited so as not to exceed two years, maximum wage paid at the expiration of that time.

"(*c*) Night platform service completed within eight consecutive hours.

"(*d*) Period of contract two years, ending May 31, 1917, and findings effective as of June 1, 1915.

"(*e*) No run shall be less than nine hours or over eleven hours, and no run shall pay less than nine hours' pay, except Sunday.

"Second—Questions to be arbitrated:

"(*a*) How much, if any, raise above the present wage shall be paid all employees members of the association?

"(*b*) All other points in dispute raised in the proposed contract that cannot be settled before arbitration takes place.

"Third—Subject matter to be covered upon question of ability of the company to pay, and justice of the demands of the men:

"(*a*) Actual money investment of the properties of the surface lines and returns on such actual investment.

"(*b*) Salaries and considerations paid general officers of the company and comparison with like salaries paid like officers in like corporations; also comparison between increase in such officers' salaries since the 1907 ordinance and increase in wages paid employees.

"(*c*) Nature and effect of contracts by surface lines and constituent companies, in regard to operation and charges thereon, and comparison of such contracts with like contracts in other cities.

"(*d*) Use of all books, documents and vouchers, whether private or otherwise, of the company, to determine its ability to meet the demands of the men, and profits actually earned and dividends to stockholders.

"(*e*) Relationship and extent of salaries and expenses of board of supervising engineers.

"Fourth—Plan of arbitration:

"Each party, within twenty-four hours, select a member of the arbitration board. The two thus chosen, within forty-eight hours, select a third one, who will serve, from the following five named representative citizens: Governor Edward F. Dunne, Judge Marcus Kavanagh, Carter H. Harrison, Judge William E. Dever, Judge John P. M'Goorty.

CHICAGO STRIKE—MONDAY EVENING RUSH AT ILLINOIS CENTRAL SUBURBAN STATION

"Board to be convened without delay; hearings daily except Sunday; award within ten days after close of hearing and arguments; award binding upon both parties when signed by majority of the arbitrators; rulings binding upon both parties if made by majority of the arbitrators.

"Fifth—The same arbitration board above selected and chosen shall serve in the same manner with respect to the dispute between the elevated company and the association, the arbitration to be as to wages and conditions upward of the present rate.

"The period of contract shall be the same as between the surface lines and the association, and findings to date back in the same way.

"The subject matter to be covered upon questions of ability to pay and justice of the demands to be the same as sections *b*, *c* and *d* of the surface lines' proposition under such sections, and the following:

" 'The arbitrators shall consider as to the actual investment in the property of the elevated railroads an amount not to exceed the amount determined by the valuation commission of the City Council, in their report submitted to the City Council.

"The conditions preceding the arbitration shall be along the same general lines as those prescribed with reference to the surface lines, and the period for maximum pay shall be as specified in the proposed contract and conditioned further upon the provision that, if either the surface lines or the elevated railroads shall not accept the arbitration, as herein outlined, the association withdraws the offer as to the other."

Reply of Companies

In response to this plan of arbitration submitted to Mayor Thompson, President Busby, of the surface lines, and President Budd, of the elevated lines, to show that they were seeking nothing but the prompt settlement of all these questions on a basis of fair arbitration, submitted the following proposition:

1. We offer to arbitrate all questions pertaining to working conditions.

2. We offer to arbitrate the question of wages, including wage scale for employees who are members of the association. We further state that we shall not in that arbitration ask for any decrease in the rate of wages of any employees.

3. We offer to arbitrate any other question upon which we are unable to agree.

4. We will accept a board of arbitration selected as follows: The association will select one man, the company will select one man. If these two men are unable to agree upon a third arbitrator within forty-eight hours the Mayor of Chicago will tender five names, the arbitrator chosen by the association to have the right to strike out two names, and the arbitrator chosen by the company to have the right to strike out two names, and the remaining name to be the third arbitrator.

In response to the request that the railways be given time to call their directors together on June 14, to place the whole proposition before them, the representatives of the employees declared that a strike would be called at midnight Sunday, June 13. Since some of the members of the board of operation of the Chicago Surface Lines were out of the city, it was impossible for them to take any action on this ultimatum. At the time set all the men turned in their runs. During the strike the surface railways did not attempt to operate while the elevated railroads were able to operate trains at a fifteen-minute headway between Sixty-first Street, the terminal of the South Side Elevated Railroad lines, and Wilson Avenue, the terminal of the Northwestern Elevated Railroad lines. For this service old employees were used who had refused to accede to the union order.

The Effect on Chicago Transportation

The combined surface and elevated railways in Chicago transport 3,750,000 passengers daily. All the steam roads with suburban service and a number with lines through districts not served by any other means of transportation put into operation all the passenger equipment they could muster, but even with this equipment the steam roads were taxed to the limit during the morning and evening rush hours. In fact, the congestion was so great that conductors found it practically impossible to collect tickets en route. Passenger-carrying vehicles of every description were put in service on the streets. Every available motor truck was equipped with seats and charges for the haul from the Chicago loop district to points 5 and 6 miles out varied from 10 cents to $10 per passenger. On Monday morning most everybody was delayed in reaching his place of business, and some were unable to get downtown. By Tuesday the improvised modes of transportation had been so perfected that most persons were able to reach their places of business at the regular time. Vehicular traffic on the principal streets in the "loop" district and the arteries leading to the various steam-road stations became greatly congested.

Only one attempt at violence was reported on Monday. A wooden block was hurled through a window of an elevated train from a building beside the South Side Elevated structure and a police detective was slightly injured by flying glass.

CHICAGO STRIKE—EVENING RUSH IN THE NORTHWESTERN RAILROAD STATION

Approximately 14,000 men and women were engaged in the strike. Of this number 300 were ticket agents, 2900 were trainmen and other employees in the elevated railroad service. The number of surface line trainmen, car cleaners and repairmen called out was about 10,800.

EVENTS ON JUNE 14 AND 15

At the regular meeting of the Chicago City Council on Monday night Mayor Thompson was empowered to name a special committee of Aldermen to take charge of the strike situation in so far as the city government was concerned and to make an effort to effect an immediate settlement. The Council indorsed the Mayor's efforts to bring about peace between the companies and their employees, and passed an ordinance to prohibit the use of strike breakers. This ordinance provided that no motorman or conductor could be employed by the surface or elevated lines until he had from fourteen to twenty-one days' instruction. As the Council passed this ordinance under a suspension of rules it could not go into effect until it was signed by the Mayor, who had until the next Council meeting to approve or veto it. In other words, more than two weeks were required before the ordinance could become operative.

On Tuesday, June 15, important developments in the strike situation occurred in close succession. The inconvenience experienced by the public Monday and the full-page advertisements in all the local morning and evening papers, placed by the Chicago Surface Lines under the heading "Who Is Responsible for This Strike?", created strong public sentiment against the employees. In this advertisement all the steps leading up to the strike were outlined and the final paragraph read, "The management believes that a duty devolves upon it at this time to uphold the principle of arbitration. If this principle is surrendered there will no longer exist any peaceful and lawful method of adjusting differences of this character in this city. In deciding to adhere to and uphold the principle of arbitration at this time, the management has also undertaken to show what its position with reference to fair arbitration is by leaving the selection of the third arbitrator to be determined, in effect, by the Mayor of the city of Chicago."

ARBITRATION WINS

Early Tuesday morning Mayor Thompson called together the aldermanic conciliation committee. A series of conferences followed between this committee and representatives of the railways and employees, which at

CHICAGO STRIKE—A 10-CENT BUS WITH DESTINATION SIGN

CHICAGO STRIKE—TYPICAL LOADING ON AN IMPROVISED AUTOBUS

5 o'clock Wednesday morning ended in an agreement to submit all questions to arbitration. The principal point contested by the employees after they had acceded to the principle of arbitration, was that of selecting the third arbitrator. A number of names were suggested and finally President Busby offered Mayor Thompson as the third arbitrator, and he was accepted. The absolute fairness of the Mayor in these conferences and the firm stand he took for the principles of arbitration on a fair basis, are credited by all as being the largest factor in bringing an end to the strike. On the other hand, adverse public opinion coupled with the fact that both the surface and elevated railway companies had employed a large number of trainmen and fully intended to resume operation on all lines, caused the men to look upon arbitration as the best course.

Although the arbitrators for the employees and the companies have not been selected, all the issues they must settle have been accepted. Concessions by employees which made arbitration possible included all the items set forth in their proposed basis of arbitration, except the term of contract and the existing tripper system. President Busby for surface lines, and President Budd for the elevated railways, agreed to the two-year term of contract and to eliminate the existing tripper system of computing wages.

Points to be arbitrated upon which agreement was reached are as follows:

Percentage of straight runs and consecutive hours in which single runs shall be completed.

Maximum time covered by straight runs on Sundays.

Allowance for fall-backs for meals and reliefs if any, on the street for meals.

Hours of service including week-days, Sundays and holidays for employees other than trainmen provided for in the agreement.

Length of wage scale and wages for all trainmen, including trainmen on cinder, sprinkler, supply and other cars.

Hours of service and wages paid car repairers, motor repairers, inspectors, dopers, car placers, car cleaners, janitors, terminal men and other men around the barns.

Allowance for turning in time.

Seniority and efficiency with reference to men outside the train service.

Officially the strike was called off at 5:30 Wednesday morning, but some time was required before complete service could be resumed. The elevated railways began full schedule operation shortly after 7 a. m. and by 9:30 the service was normal. The surface lines, a

more complicated task to handle, was unable to effect full operation before about the noon hour. The announcement of the strike's end was enthusiastically received by the public and the first cars in the downtown districts were greeted with cheers. It is planned to begin arbitration as soon as the arbitrators for the companies and the employees can be selected.

Various Interviews

Regarding his efforts at conciliation which resulted in the ending of the biggest street-railway strike in history and his appointment as referee, Mayor Thompson had the following to say:

"We fought it out behind locked doors. This tells the whole story of the settlement of the strike. Both sides acted splendidly. It is a victory for the great principle of arbitration. Both sides fought desperately for their cause, but the great underlying principle at stake was

(From left to right: Mr. Budd, Mayor Thompson, Mr. Blair, Mr. Busby)

CHICAGO STRIKE—PRINCIPALS WHO BROUGHT ABOUT THE SETTLEMENT

whether we should have real arbitration or arbitration with a specific agreement beforehand. The car men were suspicious. They told of their previous experiences. But arbitration won.

"I cannot say all I would like to say about the splendid spirit of sacrifice for the common good shown by both sides to the controversy. That spirit makes for the building of a greater Chicago. The city was in a desperate plight and on the threshold of grave developments. Bloodshed might have resulted, business would have been stagnated and the public enraged. This cloud has passed and the city can settle down to business again. The situation has been tense since trouble began. Beneath the surface was a feeling of bitterness that nerved the disputants. This feeling finally gave way to sober reason.

"I accept this responsibility with a full realization of what it means. The routine duties of the city hall are hard enough, and this means extra work. But I am glad to take on the additional burden. There is too much at stake. I will do my duty as I see it. I devoutly thank God that I can be of service. I will see that a square deal is given to all concerned."

In an interview Mr. Budd said: "When the strike was declared, the entire controversy resolved itself into more than the question of wages and working conditions. It involved the principle of whether arbitration as a means of bringing about the settlement of disputes could be cast aside and force used. The railways feel that they were not only obligated to the people of Chicago, but to the country at large to maintain the principle of arbitration. They endeavored in every way possible to accommodate the public by restoring service, and the elevated railroads succeeded to the extent of operating a fifteen-minute service between Wilson Avenue on the Northwestern line and Sixty-first Street on the South Side line. This service was made possible by a number of the old employees who refused to accept the strike order. We feel that the principle of arbitration has been upheld by the railways' attitude and action. While the people of Chicago have suffered great inconvenience and discomfort uncomplainingly, and the financial loss to the community has been enormous, the compensating fact is established that reason and not force shall govern in the settlement of these differences in this community."

Henry A. Blair, Mr. Busby and Mr. Budd issued the following statement to the press:

"We settled the strike this morning at 5 o'clock, the men finally agreeing to submit all questions to arbitration. We offered the Mayor as the third arbitrator and he was accepted by the men.

"The surface lines will be in operation before noon and we hope to have a normal schedule for the evening rush.

"The people have been remarkably cheerful and patient under very trying circumstances. Mayor Thompson is entitled to the gratitude of the people of Chicago for the way in which he upheld and stood by the principle of arbitration upon a fair basis. He handled the situation throughout not only with tact, but with a remarkable degree of firmness. He never hesitated for a moment from the time he stepped into the situation to insist first and last that the matter must be arbitrated if the parties were unable to agree. In accepting the place as third arbitrator he did so knowing that this would impose a very heavy and additional burden upon him.

"Chief of Police Healey is also entitled to the gratitude of the people for the prompt and efficient way in which he organized his force for the protection of life and property. He gave every one to understand from the start that there would be no rioting in the city and none occurred.

"We feel grateful for the good will which has been manifested toward the company by the people and for the co-operation we have received from the city officials."

Sidelights on the Strike

Sidelights on the effect of the strike include a well-organized move to bring about a compulsory arbitration statute for public utilities. Former Secretary of the Interior, Walter L. Fisher, made this prediction, and such a movement is supported by a number of prominent citizens. The Federal Government also took a hand in the strike situation in connection with the Oak Park Elevated Railroad. Judge C. C. Kohlsaat, of the United States District Court, issued peremptory orders to the company to resume service at once. President Budd announced that operation on this line would begin Wednesday morning in compliance with the order of the court. The Aurora, Elgin & Chicago Railroad was permitted to continue operation over the Metropolitan West Side Elevated Railroad structure to the Fifth Avenue terminal, but only upon the understanding that local passengers would not be transported. Likewise the Chicago & West Towns Railway, operating in the suburbs west and northwest of Chicago, the Evanston Railway and the Chicago & Interurban Traction continued operation without interruption. General Manager F. L. Butler of the Chicago & West Towns Railway announced that his company would accept the result of the Chicago controversy and accordingly his employees remained at work.

Equipment and Its Maintenance

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

(Contributions from the Men in the Field Are Solicited and Will be Paid for at Special Rates.)

Los Angeles Illuminated End Destination Sign with Car and Run Numbers

BY E. L. STEPHENS, MASTER MECHANIC LOS ANGELES (CAL.) RAILWAY

The cases of our illuminated end destination signs are of No. 24 gage galvanized iron, stiffened with two ⅜-in. x 1-in. irons, and supported by cast-end brackets, as shown in the accompanying illustration. The "Hunter" sign cloth is used with soft copper edges, to keep the curtain absolutely straight and free from raveling on the edges. The size of cloth is 55½ in. wide by 40 ft. long, with block letters 5 in. high, so that the sign may be read distinctly one block away during the day or night. The present number of names used is fifty-four with sufficient spare cloth for seventeen more. At the lower left hand corner of the sign is the car number in figures 2⅝ in. high, made directly on the glass.

LOS ANGELES CAR SIGN WITH CAR NUMBER PAINTED DIRECTLY ON THE GLASS AND WITH SEPARATE MECHANISM FOR DISPLAYING RUN NUMBER

Another unusual feature of these signs is the inclusion of the run number instead of the general use of separate tags or signs. These run numbers are at the lower right-hand corner of the sign. The figures are 3 in. high, and are made on two separate strips of cloth, one 3½ in. wide by 7 ft. long, with numbers from 0 to 9 inclusive, the other 3½ in. wide by 9 ft. long, with numbers from 1 to 20 inclusive, giving a total from 1 to 200 inclusive.

Operating wheels or handles for the large curtains are provided with a friction band for holding the rolls in position. As illustrated, the run numbers are changed by means of hand wheels, fastened on ⅜-in. shafts which, by means of an interlocking device consisting of a pin in the shaft and a slot in the curtain-roll flange-hub, allow motion in either direction. The rolls are of wood, 1¼-in. diameter, and are finished with metal flanges on the ends to guide the curtains.

This sign is illuminated by three 16-cp lamps, which are connected by wires running through ½-in. gas pipe supports, as shown above the case. The extreme height, depth and length of the sign are 16 in., 11 in. and 5 ft. 3½ in. respectively.

Track Tools—Supplies and Appliances

BY R. C. CRAM, ASSISTANT ENGINEER WAY AND STRUCTURE DEPARTMENT BROOKLYN RAPID TRANSIT SYSTEM

The tools and appliances which make up the working equipment of the way department are very important items in connection with track maintenance work. This becomes more evident when available statistics are consulted wherein it will be found that under "maintenance of way and structures," the materials and labor expenditure for strictly track accounts for the average road will range between 60 per cent and 70 per cent of the total. The item of track and roadway labor will range from about 40 per cent to 60 per cent of the track maintenance costs, depending upon the character of the property. Probably the actual tool-using men will comprise between 70 per cent and 80 per cent of the gang and the greater part of their time is spent in work requiring the constant use of tools.

The design of even the simple, every-day tools such as picks and shovels, will be found to have a direct bearing upon the character of the work done when their predominance in use on the average job is considered. The cost of tools and tool maintenance may run from $225 to $250 per mile of single track on heavy reconstruction work in city streets. It therefore becomes quite apparent that first-class tools should always be used, since they cost little more than inferior grades while better work and greater durability are obtained. Good tools also furnish an incentive to good workmanship and afford no shield behind which the lazy man may hide his laziness. Good tools will also tend to lessen accidents. However, it is poor practice to purchase good tools and then neglect to ascertain that they are put their proper uses and are properly cared for until real breakage or actual wear requires their replacement.

The desirability of having standard plans of all tools seems to be evident, and such plans will be found to assist in correct purchase and inspection. If the making of these plans appears burdensome and unnecessary, it certainly is possible as well as worth while to select tools from the catalogs of reliable supply houses and always order the same makes and styles by the catalog numbers.

Each regular gang should be supplied with a full outfit of such tools and supplies as may be required by the average number of men and the character of the work done. The importance of having all gangs equipped with one style of tools is worth noting. The advantages come from the familiarity with one style of each particular tool and the avoidance of jealousies between gangs through real or fancied superiority of the same tool (jacks, for instance) over another. Also, if the gangs come together on rush work there will be less tendency to borrow the other fellow's good tools and return poorer ones in their places.

In addition to a full outfit of tools, each gang should also be allowed an appropriate number of extra tools, and parts to replace such tools as regularly require sending to the shop for repairs or redressing or are subject to a certain amount of breakage, as is the case with such items as hammer and maul handles. Even

here care should be taken to limit the extra supply because an excess tends to lessen the care necessary to conserve the supply and secure full usage up to the allowable wear limits.

Many of the larger roads find it advisable to employ a man whose sole duty is to keep track of the tool supply and maintenance. On small properties the roadmaster or general foreman should assume such duties, and some form of monthly report of tools showing stock on hand, stock away for repairs and new stock received should be rendered by all foremen who have tools in charge.

In connection with tool repair and maintenance full advantage should be taken of portable tool sharpening devices for use on the job. On large jobs it will often be found advantageous to maintain a blacksmith with his portable forge who will be available for sharpening picks, chisels and many other tools as well as for fitting up joint plates.

The repair of tools in general can best be done at some central point under the supervision of the master mechanic and upon proper orders from the way department to facilitate accounting.

On roads of the larger class, regular tool and supply cars and emergency automobile service are maintained, which make routine and special trips to the several gangs to pick up worn, broken and surplus tools and leave new or repaired tools as required. On the other hand, the smaller systems arrange to have the tools sent in for repairs on the regular work cars generally on their return after leaving materials. In some cases a man is detailed from the gang to take a bunch of tools to the repair shop, stowing them upon the front platform of the first passenger car available. This method of transporting tools is somewhat annoying to passengers, causes some delays to the car and is apt to hinder the motorman in the safe performance of his duties. It is justified only in emergencies.

One man in each gang should be directly responsible to the gang foreman for the tools. It should be his duty to see that tools are properly distributed among the men, that they are all returned to the tool box at night and that they are in good condition for use. However, this arrangement should not relieve the foreman of his responsibility for the tools and their fitness for service at any moment.

Increasing the Output of Hydraulic Presses

BY "VULCAN," A. M. I. C. E., A. M. I. E. E., ENGLAND

In forcing axles into or out of car wheels, the ram of the hydraulic wheel press often has a considerable amount of idle travel before reaching the object to be forced. On many jobs this idle travel almost equals, and on certain work considerably exceeds, the load travel, or distance moved under appreciable pressure. To give the very heavy pressure required, the ram must of necessity move very slowly. With the ordinary type of machine having only one belt-driven, constant-speed pump plunger, the traveling speed of the ram is practically the same whether the latter is exerting a light or a heavy pressure. The time wasted on idle movement is proportionately very high and various arrangements have therefore been devised with the object of increasing the ram speed at this period.

Some makers provide the hydraulic press with two plungers of different diameters, power-driven from the same crankshaft. The larger plunger, or both together, is for use during the idle movement of the ram, and the smaller one for providing the greater ram pressures required when the work is reached. Others have used a single plunger and have driven this from a two-speed countershaft. In this case the high speed is employed for small ram pressures and the low speed when the loading is great. This method has been more or less successful, but the following device, which has been adopted by the writer on presses having only one pump plunger, meets all requirements in the simplest possible manner and obviates the mechanical disadvantages of the other plans.

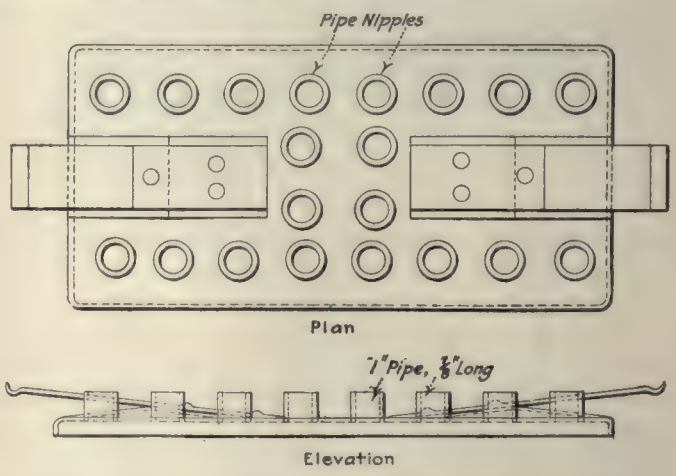
A tank is fitted on the wall of the building as high as possible above the press cylinder and it is connected to the latter through a 1-in. pipe and through a ⅝-in. hydraulic valve on the press. The tank is connected to the local water main through a ball-float valve. By supplying water from the tank to the press during the idle forward travel, a ram speed many times greater than that produced from the pump may be obtained, the tank supply being shut off when the normal forcing pressure is required.

With a tank located 20 ft. above the press it is possible to obtain by this means a total force of 680 lb. on a 10-in. ram, which is more than sufficient to move the ram forward. This addition to an ordinary hydraulic press increases the output very considerably and costs very little to install.

A Simple Ventilating Scheme for Increasing Motor Output

BY R. H. PARSONS, ELECTRICAL FOREMAN

The following scheme for ventilating a motor not originally designed as a ventilated motor will be found preferable to the method, sometimes employed, of throwing away the top covers and allowing the motor to run entirely open. A few pipe nipples and a little drilling are all that are necessary in the making of perforated, and at the same time protected, covers.



PLAN AND ELEVATION OF VENTILATED MOTOR COVER

As the accompanying drawing shows, the motor cover is drilled with a number of holes to accommodate nipples made of 1-in. pipe, ⅞ in. long. The number of holes necessary is determined by judgment to give the desired degree of ventilation. The holes should be drilled for a driving fit of the nipples, which should be well cleaned where they come in contact with the cover.

This construction allows about ¾ in. of pipe to project above the level of the cover, making it impossible for water to enter the case excepting under very unusual conditions. The size of the hole in the pipe is such as to keep out large objects, while the currents of warm air rising from the motor tend to exclude dust.

The nipples should be fastened in place with the aid of an acetylene welding outfit or an electric arc, or by brazing or soldering if welding is not practicable.

A Steel Underframe, Open-Bench Car

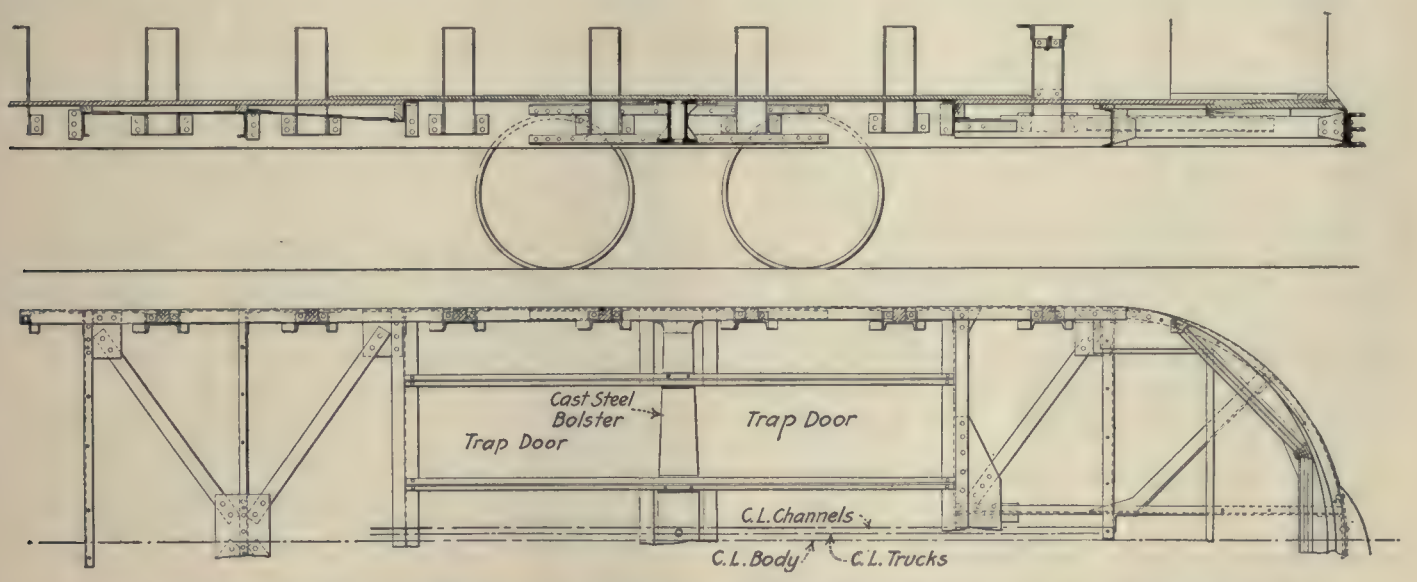
The Public Service Railway of New Jersey recently completed at its Plank Road Shops in Newark, N. J., twenty large open-bench cars. These were built to provide a large seating capacity for the summer season at a reasonable cost, this type of car being very popular on certain lines of the company. The company does not find that the proper use of open-bench cars is conducive to accidents, and such accidents as do occur are of a trivial nature. By providing ample seating capacity and keeping passengers off the running board as much as possible the results are very satisfactory.

In designing the car for minimum cost and reasonable lightness standard structural shapes were used throughout and the underframe was laid out as a truss to give the necessary resistance to horizontal twisting and end shocks, while vertical stresses were provided against through the use of deep channels as side sills.

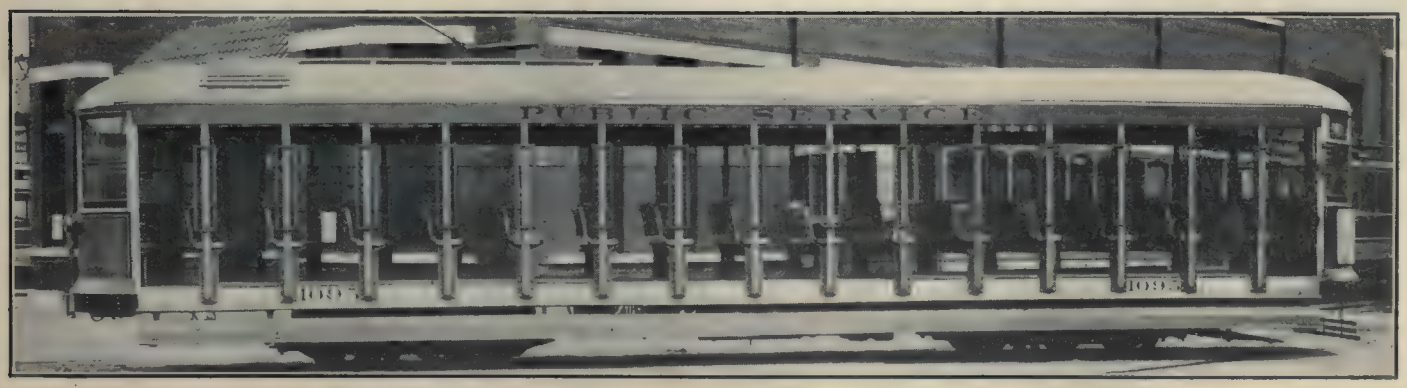
There are no bulkheads in the car, which is therefore open from end to end. A double step, of which the lower step can be folded up inside the line of the upper one to give necessary clearance, provides easy access from the street. The first step is 15 in. from the top of the rail, the next 13⅛ in., while the final step to the car floor is 8⅜ in. The floor is thus slightly over 3 ft. above the rail. Wheel guards without fenders are used on the cars.

The side sills are of 10-in. 20-lb. channels, stiffened over the bolsters with 2-in. x 2-in. x ⅜-in. angles 5 ft. 5 in. long above and 3 in. x 3 in. x ½ in. at the bottom where the channel is cut away to clear the truck frame. The end sills are of 8-in. 11¼-lb. channel. Each end sill forms one side of a truss designed to take the shock of collisions and to stiffen the frame generally. The other side of the truss is a Z-bar, 3 1/16 in. x 4 in. x 3 1/6 in. x ¼ in., so placed as to give the maximum truck clearance. That is, the high flange of the Z-bar is toward the bolster. Diagonal braces of 3-in. x ⅜-in. strap, riveted to 3/16-in. gusset plates, are used to stiffen the trusses. Near the center of the car are two other stiffening panels in the underframe. At a distance of 12 ft. 10 in. from each end sill is another Z-bar of the same size as that already mentioned, and longitudinal

PUBLIC SERVICE OPEN-BENCH CAR—FRONT VIEW



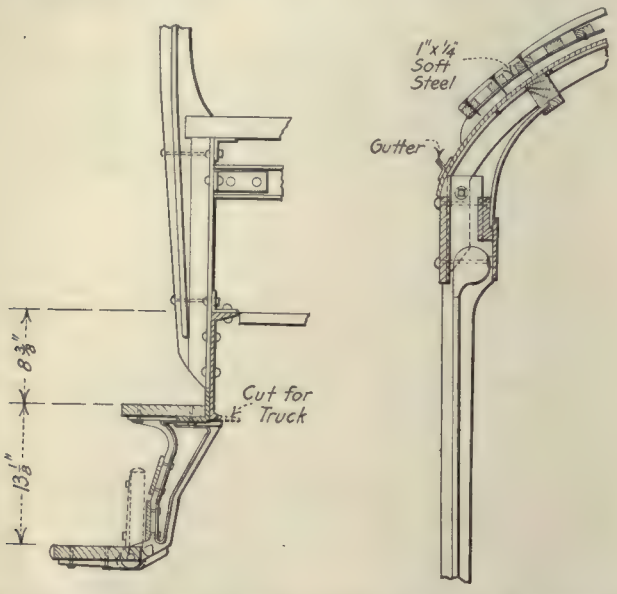
PUBLIC SERVICE OPEN-BENCH CAR—PARTIAL VERTICAL SECTION AND PLAN OF UNDERFRAME



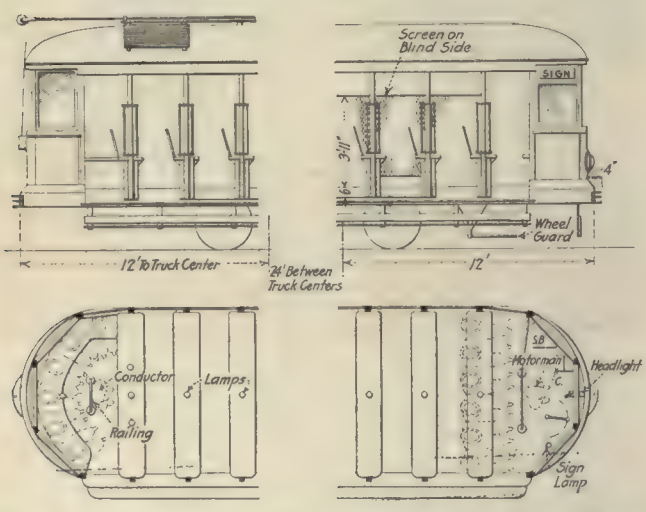
PUBLIC SERVICE OPEN-BENCH CAR—SIDE VIEW OF CAR

T-bars rest upon the flange of this and the end Z-bar, forming supports for the trap doors over the motors. These light T-bars also rest upon the bolster which is midway between, and which is the standard cast-steel bolster of the company modified somewhat to fit the deep side sills.

The bumper iron is an 8-in. channel weighing 11¼ lb. per foot, and its ends are riveted to extensions of the side sills. Fitted into the top of the bumper is a wooden crown piece 2 in. thick. The bumper is stiffened by means of two 3-in. x 3-in. x ¼-in. diagonal braces and 5-in. 6½-lb. channel knees. Nailing strips for the floor, which is of ⅞-in. pine, are mounted on the lower



PUBLIC SERVICE OPEN-BENCH CAR—DETAILS OF STEP AND SIDE POST POCKET, AND POST AND CARLINE JUNCTION



PUBLIC SERVICE OPEN-BENCH CAR—PARTIAL SIDE ELEVATION AND HORIZONTAL SECTION, LATTER SHOWING ALSO POSITION OF LAMPS

flanges of the Z-bars and upon light cross channel irons supplied for the purpose.

The side posts are anchored between two 2½-in. x 2-in. x 3/16-in. angles each, which form pockets for the posts and at the same time furnish end supports for the seats. On the step side the pocket angles are riveted on the outside of the channel, but on the blind side, in order to give a smoother exterior, they are mounted above the channel and braced securely by means of angle brackets. The seats rest upon the tops of the angles which are cross connected by 3-in. 4-lb. channels to furnish center supports for the seats.

The seats are non-reversible and are 8 ft. long between side posts. The seat proper is of 1 5/16-in. maple strips with ⅛-in. air space between. It is 15 in. deep, and 17-in. spaces are provided between adjacent seats. The back is curved to give greater comfort in riding than is possible with the straight back.

The side posts are of ash and of the standard form except that at the top they are fashioned for attachment to T-iron carlines. These carlines are 2-in. x 2-in. x ¼-in. T-irons, set into the tops of the posts in the manner shown in one of the illustrations. They are bent to form an arch roof and are covered, on the straight part, with 5/16-in. Agasote and with ⅜-in. Agasote on the curved ends.

On both ends of the car the side sash are stationary and inside lining of the end is thus rendered unnecessary. In the center of each end are two sashes, the upper of which drops outside of the lower. On each end is a Hedley combination drawhead and anti-climber.

The cars are equipped with four Westinghouse 101-B2 motors and Westinghouse HL control. The purpose in using the latter was to get the contactors out of the sight of the passengers who are apt to be frightened by the arcs in the ordinary form of controller. It is felt that the danger of accident will be thus greatly reduced.

The car is called a fifteen-bench car which rating, however, does not include the seat in the rear. As each seat accommodates six passengers the total seating capacity of the car is ninety-six passengers. Exclusive of the carlines there are about 5300 lb. of steel in the car. The weights of the different parts and of the complete car equipped but without load are as follows:

Body	13,200 lb.
Control	1,800 lb.
Air brakes	1,220 lb.
Hand brakes	200 lb.
Wheel guard	200 lb.
Motors	10,580 lb.
Trucks	13,000 lb.
Total	40,200 lb.

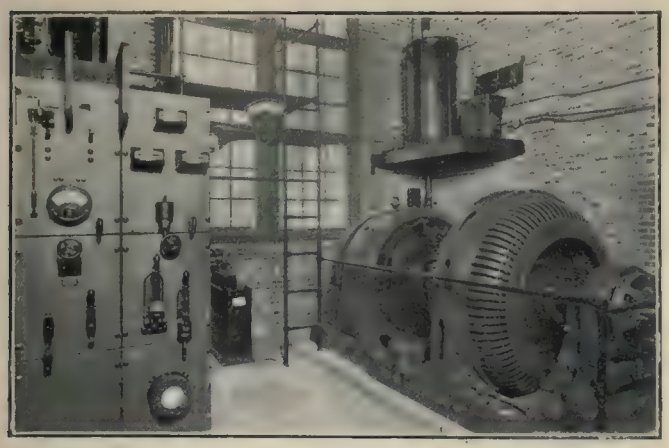
This total is about 420 lb. per seated passenger.

The new cars have just been put into operation on the company's Orange line which connects the Pennsylvania Railroad station in Newark with the Harrison Avenue terminal in West Orange. It passes through East Orange, Orange and West Orange. On this line there is considerable short-haul business. The cars are proving very popular, particularly with women.

Electrification of the Great Falls Terminal of the C., M. & St. P. Railway

The electrification of an important section of the main line of the Chicago, Milwaukee & St. Paul Railway for 3000-volt d.c. operation gives interest to an auxiliary electrification in the city of Great Falls, Mont. This city is at present the terminal of the new 138-mile feeder line from Lewiston, Mont., connecting with the main line transcontinental division at Harlowton, the eastern terminus of the main line electrification now under construction. The relation of this feeder to the main line is shown on the map published in the issue of the ELECTRIC RAILWAY JOURNAL for Nov. 14, 1914, page 1157. The Great Falls terminal yards are located in the center of the city and are connected by a cross-town line about four miles in length, known as the Valeria Way line. The total trackage in the terminal is about seven miles. The terminal buildings include a large freight house, a roundhouse, a power plant for heating purposes and a passenger station.

The Great Falls electrification is at 1500 volts, 750-volt motors in series being used on the one locomotive employed at present. Provision has been made to handle



GREAT FALLS TERMINAL ELECTRIFICATION—
SUBSTATION EQUIPMENT

freight trains up to 580 tons in weight at a speed of about 9½ m.p.h. on the maximum grade of 0.65 per cent. Three-phase electric power at 6600 volts, 60 cycles, is furnished by the Great Falls Power Company from the hydroelectric plant at Rainbow Falls, 6 miles from the substation.

The substation is housed in the heating-plant building. It comprises a synchronous motor-generator set together with auxiliary apparatus. The set comprises a 6600-volt motor, rated at 435 kva at 80 per cent power factor, with compensator starter. The generator is of the commutating-pole type, rated at 300 kw. The set can carry 900 kw momentarily. Excitation for the motor field and for the shunt winding of the d.c. generator is supplied by a 10-kw, 125-volt, d.c. exciter. The appearance of the substation equipment is shown herewith.

The locomotive is of the standard 50-ton type shown in the second illustration. It is equipped with four GE-207, 750-volt, box-frame, commutating-pole motors insulated for 1500 volts. The motors have a one-hour rating of 79 hp. They are ventilated from a blower direct connected to the dynamotor in the cab used for supplying low-voltage current for operating the auxiliaries. The gear reduction is 64 to 17. Sprague, General Electric type M control is used, and provision is made for ten series and seven series-parallel steps.

The current collector is of the type being installed on the main line locomotives, the slider being lifted into position by air pressure and held against the wire by steel coil springs. Compressed air for all purposes is supplied from two CP-29, 1500-volt motor-driven compressors located in the cab, each having a displacement of 27 cu. ft. of air per minute at 90 lb. pressure.

GREAT FALLS TERMINAL ELECTRIFICATION—
1500-VOLT ELECTRIC LOCOMOTIVE

On each end of the locomotive is a headlight containing a 100-cp, concentrated filament Mazda lamp.

The overhead line construction is of the catenary type, similar in a general way to that installed on the Butte, Anaconda & Pacific 2400-volt railroad. Both span and bracket constructions are used, depending upon local conditions. Poles are spaced approximately 150 ft. apart on tangent track, supporting No. 0000 grooved trolley wires from three-point suspension. No feeder copper is installed.

The work was done by the electrification department of the Chicago, Milwaukee & St. Paul Railroad, R. Beeuwkes, engineer in charge, under the direction of C. A. Goodnow, assistant to the president. All of the electrical apparatus, including locomotive, substation equipment and line material, was furnished by the General Electric Company.

New Forms of Fare Indicators and Recorders

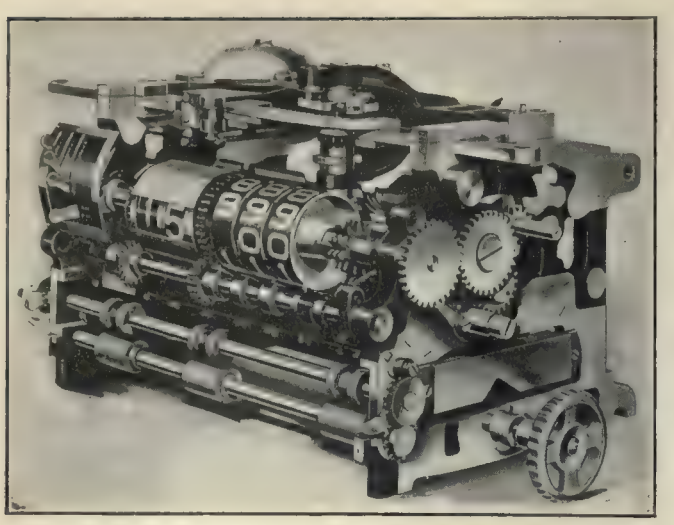
The accompanying illustrations show some of the interesting features of the new line of computing fare recorders and indicators developed by the Dayton Fare Recorder Company of Dayton, Ohio. Two illustrations show the register mechanism with the case removed. It has been designed with a view to avoiding intricate or delicate parts and the use of springs as far as possi-

INDICATORS USED WITH DAYTON FARE RECORDERS

ble, and to securing simplicity, compactness and durability. Two sets of printing counters are used in each machine, one to register and print the results of the fare collections on each trip and the other to register and print the total of all fares collected during the entire period of work by each conductor. The classification of the fares is made by means of a setting rod, and a system of fare indicators which guide the conductor in registering the fares and also serve as visual receipts. The registering operation is performed in the usual manner by means of a cord.

In connection with the register a double-dial indicator, located on the bulkhead at the end of the car opposite the recorder, and two-way indicators located in the center of the car and in each compartment are used to indicate the amount of fare paid.

The double-dial indicator, comprising two dials and two hands or pointers, each indicating a different range of fares, is shown in one of the illustrations. The two-way indicators are small cylindrical devices having openings on both sides through which the fare indi-



MECHANISM OF DAYTON FARE RECORDER, FRONT VIEW

cations can be seen. One of these is also illustrated. All of the indicators work in unison, permitting the checking of the classification of registration from every part of the car.

An improved type of indicator is also used on the recorder to verify the registration. To show positively when the mechanism has been changed to cancel the indications, a "Fare Paid" sign and a "Not Registered" sign are used. When a fare is registered the "Fare Paid" sign appears prominently above the indicator, and when the position of the indicator is changed to indicate a fare different in denomination or kind from that last registered the "Fare Paid" sign disappears and the "Not Registered" sign is exposed to view. The latter remains prominently above the fare indicator until a fare is registered, when the "Not Registered" sign disappears and the "Fare Paid" sign is again brought into the indicating position. This method of distinguishing the fares actually registered from those only indicated and keeping the indicators distributed throughout the car in unison with the indicator on the recorder overcomes the serious objection to having the indicator covered up during the registering operation. When the indicator is so covered it is impossible to check registration when the fares are "bunched" or rung up in rapid succession.

All of the connections from the operating mechanism to the recorder are made by means of intersecting shafts and bevel gears, no sprocket chains being used. The mechanism is, therefore, smooth and nearly noiseless in operation.

This type of register makes complete computations of the fares registered, the detail and total registrations being printed in the form of a balance sheet, like that shown herewith, ready for the receiving office. The printed record is a double check upon the fare collections.

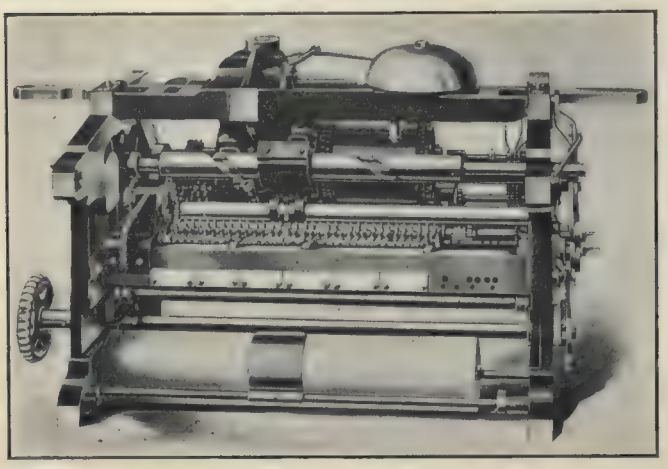
RECORDER NO 2950 THE CLEVELAND & EASTERN TRACTION CO. RUN NO. ____ TOTAL RECORD MOTORMAN ____ LINE NO. ____ DATE ____

	PASS	TICKET	TRANSFER	5c.	10c	15c	20c.	25c.	30c.	35c.	40c.	45c.	TOTAL PASSENGERS	REGISTER TOTAL
	14	83	26	37	53	48	21	26	12	14	6	17	339	15987

TRIP RECORD

TIME														CAR NO. 1426
11 00 PM	02	08	05	03	07	04	3	2	1	2	0	4	41	C-2550
9 45 PM	03	08	07	04	08	08	2	4	1	2	1	2	50	C-2550
8 30 PM	00	12	04	08	06	09	7	5	2	3	2	1	59	C-2550
7 15 PM	03	15	02	07	1,0	12	4	6	2	1	1	3	68	C-2550
6 00 PM	04	11	04	07	10	09	3	6	3	4	2	3	66	C-2550
4 45 PM	02	09	04	08	12	06	2	3	3	2	2	4	57	C-2550
3 30 PM	00	00	00	00	00	00	0	0	0	0	0	0	00	C-2550

SAMPLE RECORD SHEET FROM DAYTON FARE RECORDER



MECHANISM OF DAYTON FARE RECORDER, REAR VIEW

Temporary Drilling Outfit for Toe Plates

A second running board on open cars has been recently ordered by the Massachusetts Public Service Commission, and in response to this the Holyoke Street Railway has set up a temporary drilling outfit in the carhouse as shown in the accompanying photograph to save handling the heavy toe plates to and from the machine shop. These plates are 4½ in. wide and ⅛ in. thick, and are frequently 25 ft. long. A vertical drill was installed in an aisle of the shop. This drill is belt-driven by a 2-hp, 550-volt d.c. motor which is used in the summer to run an ice-cream freezer at a park controlled by the company. A temporary cable and starting box for this were rigged up in the shop. The stock is laid on a plank about 35 ft. long, that is supported on wooden horses. A minimum of handling is required as the car undergoing alterations stands within 5 ft. or 6 ft. of the machine, and in operation the equipment has proved to be a time-saving and a labor-economizing arrangement.

TEMPORARY DRILLING OUTFIT

Trade-Marked Waste

A novelty that will interest every electric railway official who may have to do with the work of the repair shop or carhouse has recently been brought out in the form of trade-marked waste. The material, which is manufactured by the Royal Manufacturing Company, Rahway, N. J., is selected waste of high-grade cotton and wool, refined by the removal of all impurities and cleared of the small pieces of wood, wire, etc., that are a far too frequent annoyance at present. The waste is made extra soft, absorbent and spongy. It is reported to absorb even the stickiest kinds of grease, and it is

manufactured in twelve special grades, six white and six colored, all of which are absolutely standardized.

The most interesting feature of the product, however, aside from its standardization of quality, lies in the fact that the weight of each bale is guaranteed and that the tare weight is also warranted to be within 6 per cent of the net weight, refunds being made in case a greater difference is found to exist. This standardization of the bale weight naturally puts a stop to the custom of furnishing and billing for bales weighing 125 lb. or even 150 lb. when 100-lb. bales were ordered. In filling orders for Royal waste the makers give the exact poundage that is ordered.

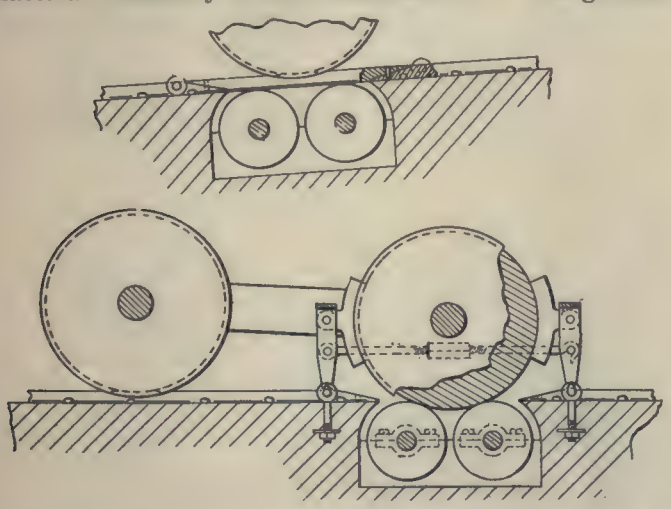
Corrosion Test of Sheet Steel

At a recent meeting of the American Iron and Steel Institute Dr. A. S. Cushman reported results of a corrosion test made by bending up the edges of flat non-corrugated sheets so as to make of them shallow pans. These pans were filled wih coal slack cinders and exposed in a horizontal position so that the rains could descend upon them. The results are given in the accompanying table.

Material	Sul.	P.	C.	Mn.	Cu.	Ni.	Condition after nine months
Bessemer steel.....	.038	.094	.012	.36	.016	—	15 holes
Basic coppered steel..	.028	.008	.10	.19	.26	—	6 holes
Pure basic O. H. iron..	.020	.004	.012	.008	.032	—	sound
Pure basic O. H. iron..	.029	.006	.012	.023	.024	—	1 hole
O. H. nickel alloy....	.020	.007	.010	.037	.036	.16	5 holes
O. H. copper nickel alloy	.019	.009	.010	.015	.23	.26	6 holes
O. H. copper nickel alloy	.027	.006	.010	trace	.17	.20	sound
O. H. high nickel alloy	.024	.004	.010	.015	.028	1.00	sound

An Inexpensive Wheel Grinder

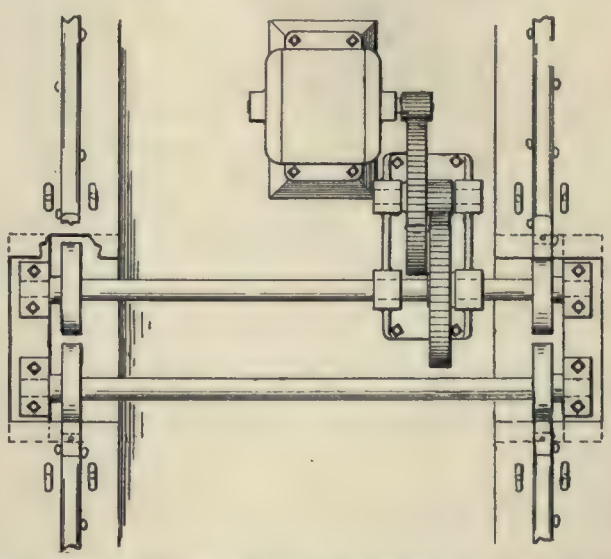
A cheap and practical wheel grinder to be used in connection with the well-known wheel-truing brakeshoe has recently been patented by the Wheel-Truing Brakeshoe Company, Detroit, Mich. It is not the company's intention, however, to manufacture this apparatus but to allow such of its patrons as wish to grind their wheels in the shop rather than on the road to make use of it in accordance with their needs. The material necessary in the construction of the grinder



CROSS-SECTIONAL ELEVATION OF DEVICE WITH TRUCK IN PLACE, AND SECTION SHOWING REMOVABLE SECTION OF RAIL REPLACED

is to be found in or about almost every carshop and the device can be cheaply and easily assembled by the shop force.

The advantages of the machine are self-evident from the accompanying cuts. It is not necessary to remove wheels for grinding nor is it necessary to jack up the car. Idle wheels or trailers can be ground as well as driver wheels, because in all cases the wheel is rotated by an under-running roller to which is geared a motor set in a shallow pit between the rails. Normally, these rollers are covered by a removable section of rail, but when it is desired to grind a wheel the rail section is removed and the car is run forward until the wheel in question rolls down the beveled joint that is provided

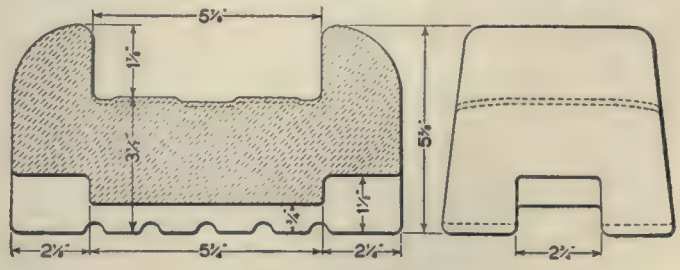


PLAN OF WHEEL GRINDER, SHOWING DRIVING GEAR AND MOTOR

for the removable rail section and rests upon the rollers. Wheel-truing brakeshoes are then attached to a pair of uprights on either side of the wheels, and pressure is applied between these shoes and the wheel tread by means of a turnbuckle on a rod connecting the two uprights. Any degree of pressure within the capacity of the motor may be applied in this way. Both wheels on an axle may, of course, be ground at the same time, as rollers and uprights for brakeshoes are installed on either side of the track.

A New Third-Rail Insulator

A new third-rail insulator, known as the Type K, has been placed on the market by the Ohio Brass Company. The insulator is held in position by means of a bar-iron forging that is lagged to the tie. Across the bottom of the insulator are slots, recessed at each end, to provide clearance for lag-screw heads. The forging may be extended to provide a support for a protection board, if



THIRD-RAIL INSULATOR

so desired. The device is covered by the Roger patent No. 1,090,234, issued March 17, 1914, half interest of which has been assigned to Nathan Shute, and the Ohio Brass Company has entered into a contract that gives it exclusive manufacturing and sales rights for the general market under that patent. A large number of these insulators have already been placed in service on an important Eastern road, where they have proved highly satisfactory.

News of Electric Railways

SIR EDGAR SPEYER'S RETIREMENT

The Part He Played in Connection with the London Underground System

The retirement of Sir Edgar Speyer from all his public positions in England was referred to briefly in the ELECTRIC RAILWAY JOURNAL of May 22. The part played by Sir Edgar in the work put under way in connection with the London underground roads by the late Charles T. Yerkes is not fully appreciated in this country, except perhaps in banking circles. Commenting on the retirement of Sir Edgar and on the work the London *Financial News* said in part in a recent issue:

"From the city's point of view one of the most striking results of the recent campaign against everyone of German origin living in this country has been the announcement from Sir Edgar Speyer that he has determined to resign his membership of the Privy Council, as well as his other honorary distinctions, and to ask for the revocation of the baronetcy conferred upon him in 1906. He also retires from the chairmanship of the Underground Electric Railways, which he has held since 1906, following the death of C. T. Yerkes.

"His succession to Mr. Yerkes was, in itself, natural enough. Though the latter was the actual organizer of the scheme for the acquisition and conversion of the District Railway to an electrically-worked line, the financial power behind the throne was James Speyer, head of the New York house of Speyer & Company. Mr. Edgar Speyer, as he then was, had assumed control of the London house of Speyer Brothers in 1887, and at the time of this American invasion in 1902 he had already established his reputation as one of the ablest financiers in the city.

"As it happened his accession to the control of the Underground Electric Railways occurred at a time when his services were of the utmost importance. The position in 1906 was exceedingly critical. The hopes of those who had embarked upon the scheme for providing London with a rapid transit service by means of tubes and the electrification of existing underground railways were threatened with disaster on account of the growing competition of the municipal tramways and the threat of the motor omnibus. The financial crisis in America in 1907 brought matters to a head, and it was then that Speyer Brothers stepped into the breach, and by arranging, in conjunction with the American and Frankfurt houses, for the payment of the December coupon on the 5 per cent profit-sharing notes saved the situation, and gave time for a reorganization of the concern under more favorable conditions. The operation involved the payment of a sum of about £175,000, and the courageous action of the firm did much to rehabilitate the company's fortunes. Since then the Underground Electric Railways has floated into smoother waters, but much yet remained to be done, and in the subsequent negotiations which have resulted in the consolidation of all the principal tube railways with the District, the London United Tramways and the London General Omnibus Company, Sir Edgar Speyer has played the leading part, and may almost be said to have been the controlling genius."

MAYOR CHURCH'S ATTITUDE

Discussing the work of the Ontario Legislature with respect to the railway measures affecting Toronto, Mayor Church of that city said recently:

"When the city's bill was before the private bill's committee of the Ontario Legislature last session, one clause related to the taking over of the Toronto & Suburban Railway in ward seven and the cancellation of the franchise of the company on the streets not built on. The bill was considered by the committee under the chairmanship of I. B. Lucas, attorney-general, but it was laid over, and the attorney-general advised the city to prepare a brief of the whole matter and take it up with the government in the recess, so that, if necessary, the government might deal with the matter in a general way. I am having the brief prepared.

"The report of C. R. Barnes on traffic in Toronto was another matter before the private bill's committee. The city asked for an order to compel the company to carry out the recommendations in the report and build 150 new cars and a further 13 miles of new track at once. The bill would have passed the committee only for the promise of R. J. Fleming, manager of the Toronto Railway, that fifty new cars would be ready next fall, and the tracks built. This it has not done, the Railway Board having allowed the company an extension owing to the war and the financial situation. The company has since been allowed to take a large number of cars off the existing routes and to dismiss more than 100 men, and further to restore the old timetable of 1911, although the railway act says that the company is not to use this without first having the Railway Board approve the new time-table. Another matter is the running-board on the open cars. The whole matter should be taken past the Railway Board to the government, and a new form of summer car ordered, and a private bill laid at the next session to give effect to it. The Board of Control has decided to confer with the government. I am going to take all these matters up with the attorney-general. The city has appealed to the Governor-in-Council from the decision of the Railway Board and I propose to bring these matters before the Board of Control."

CLEVELAND & YOUNGSTOWN RAILWAY

After making a trip over the proposed freight terminal to be built by the Cleveland & Youngstown Railway, the transportation and trolley freight committees of the Cleveland Chamber of Commerce on June 10 informally agreed to support the company's plans before the City Council.

At a meeting of the City Council as a committee of the whole on the following day Attorney J. L. Cannon, representing the company, stated that the company is perfectly willing to revise its plan as far as possible, in order that the inconvenience resulting from the change in streets may be minimized.

Members of Council made a tour of the property on June 8. They were accompanied by Attorney J. L. Cannon and W. E. Pease, chief engineer of the company. Both members of Council and the committees of the Chamber of Commerce visited the congested freight depots of the steam roads and were shown the advantages that would accrue from proper terminals practically on a level with the business section of the city. It is estimated that the cost of transportation from the stations at present is 20 cents a ton.

Councilman Bernstein insisted at the various meetings that a clause be included in any franchise to the effect that electric power be used for the freight terminal.

MERIT SYSTEM SUGGESTED FOR DETROIT

In reply to the request of officers of the street car men's union for modifications in the agreement existing between the union and the Detroit (Mich.) United Railway, particularly as related to disciplinary matters, F. W. Brooks, general manager of the company, has suggested the re-establishment of the merit and demerit system to replace the suspension plan now in effect. Mr. Brooks points out that the suspension plan, which has been favored by the union, frequently works a hardship on the wives and families of offenders without benefiting the service. He suggests the appointment by the company of a disciplinary officer who shall hear all cases that arise, whether for acts resulting in merit or demerit marks, with provision for quick appeal from the decision of this officer. Mr. Brooks offers the plan of immediate appointment of a board of five, three by the company and two by the union, to establish a standard of marks to be given under the merit and demerit system. It is also suggested that in future all arbitration boards have five members instead of three. In reply to the suggestion that the speed of cars be reduced, Mr. Brooks points out that frequent complaint is made by the public that the present average schedule speed of 9.25 m.p.h. is too slow.

NEW JERSEY GAS CASE

State Court of Errors and Appeals Reverses Own Decision, but Case Will Be Carried to Supreme Court

By vote of six to four the Court of Errors and Appeals of the State of New Jersey has reversed its decision of Dec. 9, 1914, which in turn reversed a Supreme Court decision affirming a 90-cent rate order of the Board of Utility Commissioners applying specifically to the so-called Passaic District, but upon recommendation of the commission extended by the company to all communities in which it operates. The case is of interest to all other public utility corporations because of the contention, now disallowed, that a special franchise is property and has value which must be considered in establishing a basis for the regulation of rates. On June 17 the company decided to take a writ of error to carry the case to the Supreme Court of the United States.

The case originated in a complaint filed with the Board of Public Utility Commissioners in June, 1911, by the Mayor of Paterson, which is in the Passaic district, relating to all public utility rates charged in that community. On Dec. 26, 1912, the commission fixed a 90-cent rate for gas to be effective on Feb. 1, 1913. The case was then taken before the Supreme Court, which in July confirmed the order of the commission. Carried to the Court of Errors and Appeals, the Supreme Court decision was reversed and the 90-cent rate order was set aside. Immediately following the decision a petition for a rehearing was filed and allowed and the reargument was heard early in March. As a result the original order is again enforced. The decision of the Board of Utility Commissions was published on page 35 of the issue of this paper for Jan. 4, 1913; that of the Court of Errors and Appeals on page 1331 of the issue for Dec. 19, 1914.

In order to explain the course followed by the case in the courts the following facts regarding the conditions may be of interest. The Supreme Court of the State of New Jersey consists of nine members, who usually deputize the hearing of causes to branches of three justices each. The Court of Errors and Appeals, to which appeals are made from Supreme Court decisions, consists of all the members of the Supreme Court and in addition six lay judges who are theoretically laymen. As a matter of fact, all but one of the lay judges are now lawyers. The chancellor of the State presides over the Court of Errors. In this court the three Supreme Court justices who formed the branch court hearing the original action are debarred from serving on the Court of Errors and Appeals, so that thirteen of sixteen members only are available. In this particular case after the arguments had all been made before the Court of Errors and Appeals two members died and a third failed to vote in the decision, leaving only ten to make the decision which reversed by six to four the Supreme Court decision. When the case came up for rehearing the two vacancies caused by death had been filled, the three members of the original branch court were still debarred, one of the new members declined to sit on account of his having been a member of the commission which made the original ruling, another judge withdrew from the case so as to remove any possible suspicion of prejudice due to his business connections, and the term of another, who was ill when the reargument was started, expired before the case was concluded. As a result the same number of judges heard the reappeal and they reversed their own decision by the same vote, six to four. Those who voted on both appeals voted the same way, but the new members reversed the votes of the judges whom they replaced.

COMMERCIAL EDUCATION FOR FOREIGN TRADE

The National Foreign Trade Council of New York has sent letters to the heads of 1000 corporations and firms engaged in foreign trade asking responses to five questions bearing on the adaptability of the American system of commercial education to the needs of foreign trade and what changes should be made to render the system more helpful. The inquiry is made through the committee on commercial education for foreign trade, which is composed of business men and educators. The data obtained will be communicated to a large number of educators and made the basis for a consultation of educational opinion, with the idea that this will lead to changes in curricula.

Commission Bills in Alabama.—Several bills have been introduced into the Legislature of Alabama with the object in view of creating a public utilities commission for the State.

Fire at an Amusement Park.—On June 5 fire broke out at Rock Springs Park, Chester, W. Va., owned by the East Liverpool Traction & Light Company, East Liverpool, Ohio, and leased to an amusement company. Several persons were badly burned.

Small Property for Sale.—The Hendersonville (N. C.) Traction Company, it is understood, would entertain an offer to purchase its property. The line is 2 miles long and extends from the railroad depot to Columbia Park. Two Carlson gasoline cars are operated. The president of the company is David L. Fuller.

Decision in Superior Fare Case.—The Supreme Court of Wisconsin has confirmed the ruling of the Circuit Court of Dane County sustaining the order of the Railroad Commission of Wisconsin requiring the Duluth (Minn.) Street Railway, operating in Duluth, Minn., and Superior, Wis., to sell tickets in Superior at the rate of six for 25 cents.

Steinway Tunnel Ready.—The Interborough Rapid Transit Company has notified the Public Service Commission for the First District of New York that the Steinway tunnel, connecting Manhattan and Queens, will be opened for traffic at noon on June 22. Three trains composed of four cars each on a headway of four to five minutes will be operated under the opening schedule.

Rapid Transit Bill Disapproved. — Governor Brumbaugh of Pennsylvania has vetoed the bill to give cities of the second class in that State the right to build or to acquire by lease or purchase underground or elevated railways. The Governor characterized the move as "a proposed adventure by municipalities into a range of service that were far better left to competition and to the action of the local authorities."

"Advertising Week."—The eleventh annual convention of the Associated Advertising Clubs of the World will be held in Chicago, Ill., June 20-24. This organization includes all branches of periodical publishing, daily, weekly, monthly, popular, religious, technical trade, etc. President Wilson has accepted an invitation to present an address. Cabinet members will attend and the Mayor of Chicago has officially recognized this gathering by proclaiming "Advertising Week."

Changes in Power Arrangement.—The Texas Traction Company's lines, beginning July 1, will be furnished with power by the Texas Power & Light Company. In the past the railway has operated its own power plants, but a company was organized recently to take over the light and power plants. The transmission lines between Dallas and Denison are being changed from 19,000 volts, twenty-five cycles to 30,000 volts, sixty cycles. A survey is being made at the present time for a transmission line from Waco to Taylor.

Decision on Delayed Deliveries.—The Supreme Court of Appeals of Virginia has set aside a verdict obtained by the Westinghouse Electric & Manufacturing Company against the Washington & Old Dominion Railway for $81,652 for apparatus supplied. The railway company claimed that the material had not been delivered on time, and in consequence it had been obliged to operate its Bluemont branch for six months by steam power at larger expense than it could have been operated by electric power.

Source of Trouble Removed.—Motorman Peter J. Whaling, because of whose discharge for reckless operation the motormen and conductors of the Detroit (Mich.) United Railway went on a one-day strike, is no longer in the employ of the company. Whaling was returned to the service by a majority of the arbitration board in his case, but charges outside of his activities as a company employee were filed against him last week by a fellow employee and before any further action looking to his discharge by the company was taken Whaling left the service.

Sale Offer in Alexandria.—The Southern Traction & Power Company, Alexandria, La., has offered to sell the street railway property to the city for $50,000, less the price of rail already sold, taking payment in certificates

of indebtedness issued by the city maturing within ten years and bearing interest at 5 per cent a year. As an alternative the company has suggested the fixing of the sale price by two disinterested engineers. The appointment of receivers for and the suspension of service by the company were referred to in the ELECTRIC RAILWAY JOURNAL of June 5, page 1088. If the offer made by the company to the city is not accepted the property will probably be offered for public sale by the receivers about Aug. 1.

Freight Subway Ordinance at Cleveland.—The ordinance giving the Cleveland, Akron & Canton Terminal Railroad the right to build a subway under East Fifty-fifth Street, Cleveland, passed to its second reading in the City Council on the evening of June 14. Disputed points between the city and the company are to be taken up by special committees. It was announced by representatives of the company that the proposed clause requiring a valuation of the land to be filled in at the foot of East Fifty-fifth Street at the end of seventeen years would be equivalent to killing the entire proposition. It is also proposed to reduce the period of the franchise from ninety-nine to seventy-five years.

Sale or Lease of Seattle Municipal Line Suggested.—The sale or lease of Division "A" of the Seattle Municipal Railway to the Puget Sound Traction, Light & Power Company is proposed in a resolution introduced in the City Council by Councilman Allen Dale. The resolution recites the difficulties encountered by the city in acquiring the Rainier Valley line, the Seattle, Renton & Southern Railway and in extending Division "A," and provides that the city utilities committee, when it takes up for consideration the use of canal bridges by the Puget Sound Traction, Light & Power Company, shall also consider the sale or lease of Division "A" to the company, with the understanding that it be connected with the present system and extended to meet new requirements. It is understood that Mayor Gill favors leasing the property.

The Cleveland 1-Cent Fare Line.—Statements which have appeared in the daily press elsewhere than in Cleveland have misrepresented the 1-cent fare line in Cleveland. The fare on all the lines in the city except the one in question is at present 3 cents with 1 cent for a transfer. The line on which the 1-cent fare is in force extends from the Public Square to the new passenger piers on the lake front, a very short distance. Three cars are operated on it. Nearly all the patrons of the line use the regular city cars, and it was decided that the simplest method of operation would be to charge a 1-cent fare on the line to the piers, patrons who change to or from the regular city cars at the Public Square paying the usual fare on those cars. This relieves the conductors on the pier line from handling transfers and facilitates rapid loading at the terminals. The establishment of this line and this rate of fare is entirely separate from all other lines and the rate of fare on those lines. It is an experiment being made to meet operating conditions for the purpose previously noted.

Franchise Without Consents Valid.—In the case of residents of Reading Road, Cincinnati, Ohio, against the city and the Cincinnati Traction Company, to prevent the construction of a street railway on that thoroughfare to furnish service to the village of Bond Hill, the Hamilton County Court of Appeals on June 1 held that the legislation relating to the procuring of consents under Sections 3770 to 3777, and Section 9105 of the general code is unconstitutional, and that the ordinance passed by the Cincinnati Council, giving the company a franchise on Reading Road, without securing the consents of a majority of the owners of abutting property, is a valid legislative enactment. The case has been taken to the Supreme Court in an action known as David L. Carpenter et al. against the City of Cincinnati et al. Mr. Carpenter represents the residents of Reading and Paddock Roads, and he asks that the Cincinnati Traction Company and the city of Cincinnti be restrained from building a track through these streets for the extension of the Avondale line to Bond Hill. The Superior Court granted a permanent injunction to the property owners some time ago, but it was recently reversed by the Appellate Court. The case hinges on the necessity of obtaining consents of property owners along the proposed line.

PROGRAMS OF ASSOCIATION MEETINGS

New England Street Railway Club

The annual ladies' outing of the New England Street Railway Club will be held on June 25 at the Point Shirley Club. It is planned to have the members leave Park Square, Boston, at 10 a. m. for an auto ride through some of the beautiful sections of the North Shore and Point Shirley Club. Those who do not care to take the auto ride can go by ferry from Rowe's wharf on Atlantic Avenue to East Boston, connecting with the narrow-gage line for Winthrop Beach station, there taking the Point Shirley Street Railway for the club. Dinner will be served at the club at 1 p. m. The entertainment program will be begun at 3 p. m. It will include baseball and athletic sports, dancing, whist, etc. The return to Boston may be made at any time desired. Tickets, including the auto ride and everything except transportation between Boston and the club, are $2.50 each. The outing will be held rain or shine.

American Institute of Electrical Engineers

At the annual convention of the American Institute of Electrical Engineers, to be held at Deer Park, Md., from June 29 to July 2, the following papers dealing with electric railway matters will be read and discussed:

"Construction and Maintenance Costs of Overhead-Contact Systems," by E. J. Amberg and Ferdinand Zogbaum.

"Contact System of the Butte, Anaconda & Pacific Railway," by J. B. Cox.

"Third-Rail and Trolley System of the West Jersey & Seashore Railroad," by J. V. B. Duer.

"Unprotected Top-Contact Rail for 600-Volt Traction System," by Charles H. Jones.

"Contact Conductors and Collectors for Electric Railways," by C. J. Hixson.

"Contact System of the Southern Pacific Company, Portland Division," by Paul Lebenbaum.

The headquarters will be at Deer Park Hotel.

New York Electric Railway Association

The complete program has been announced for the thirty-third annual meeting of the New York Electric Railway Association to be held at the Oriental Hotel, Manhattan Beach, New York, Tuesday and Wednesday, June 29 and 30.

Following the regular business meeting of the association at 10 a. m. on June 29 the reports of committees will be presented by John J. Dempsey, chairman, on safety rules, and by James P. Barnes, chairman, on workmen's compensation insurance. The subject for discussion at this session is "The Proper Type of Car for City and Suburban Service," introduced by W. G. Gove, superintendent of equipment of the Transit Development Company, Brooklyn, N. Y. At the session on the afternoon of June 29 the subject for discussion is "What Can We Give for a Nickel?", introduced by E. G. Connette, president of the International Railway, Buffalo, N. Y. Three-minute written discussions by members will follow both papers.

At the session on June 30, at 10 a. m., the subjects for discussion are "Jitney Bus Competition," introduced by James E. Hewes, general manager of the Albany Southern Railroad, Rensselaer, N. Y., and "The Protection of Interurban Railway Highway Crossings," introduced by William H. Hyland, claim agent of the Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y. The question box will also be opened at this session. The questions for discussion under this head have been published in this paper.

The annual banquet will be held at 8:30 o'clock on Tuesday evening. The speakers will be William Temple Emmet, of the Public Service Commission for the Second District; Charles C. Peirce, vice-president of the American Electric Railway Manufacturers' Association; Nathan C. Kingsbury, vice-president of the American Telephone & Telegraph Company, and E. E. McCall, of the Public Service Commission for the First District. An excellent entertainment program will be provided, with special features for the ladies. Arrangements for space for light exhibits can be made directly with Joseph B. Greaves, manager of the hotel. Hotel accommodations may be secured direct through Mr. Greaves.

Financial and Corporate

ANNUAL REPORTS

Terre Haute, Indianapolis & Eastern Traction Company

The statement of income, profit and loss of the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., for the year ended Dec. 31, 1914, is as follows:

Gross earnings from operation		$3,168,532
Operating expenses		1,866,002
Net earnings		$1,302,530
Taxes		142,945
Earnings from operation, less operating expenses and taxes		$1,159,585
Other income —		
Dividends on stocks owned, etc.	$129,146	
Sale of power	116,161	
Total		$245,307
Earnings from all sources, less operating expenses and taxes		$1,404,892
Deductions and rentals:		
Bond interest	$803,106	
Dividends	218,813	
Interest on notes	26,665	
Maintenance of organization—leased lines	3,000	
Total		$1,051,584
Surplus		$353,308
Sinking fund		116,301
Balance		$237,007

The total operating expenses during 1914 were 58.89 per cent of the gross earnings. There was an increase of $123,573 in the railway department, of which additional expenditure $66,000 was for maintenance of track and roadway, reballasting, etc. The increase in wages granted to motormen and conductors on April 1, 1914, made an increase of $35,910 in operating expenses. The light and power department showed an increase of $22,521 in operating expenses. There was an increase of $14,895 in taxes paid in 1914. During the year there was expended and charged to capital account for added property the sum of $217,659. Of this amount, $169,598 was expended on leased lines and $48,061 on owned lines. Further installations of block signals were made on the Northwestern, Martinsville, Eastern and Brazil Divisions.

In 1914 the company paid $141,102 to the trustees on account of sinking funds. Up to Dec. 31, 1914, the total amount, par value, of bonds held for sinking funds, including cash in hands of trustees to purchase additional bonds, was $435,519. No dividends for the company proper were paid during 1914. The surplus of $237,007 was expended for construction purposes, for which no securities have been issued, and in the reduction of the company's liabilities.

Owing to the very serious business depression, the increase in gross earnings for 1914 over 1913 was only 1.8 per cent, the greater part of this coming from the light and power department. There was also a decrease of $162,354 in the dividends received from the Indianapolis Traction & Terminal Company, all of the stock of which company is owned by the Terre Haute, Indianapolis & Eastern Traction Company. This was also caused by the depression in business and the increased operating cost of the Indianapolis Traction & Terminal Company, the increase in wages of trainmen and other employees resulting from the award of the arbitration commission in March, 1914, adding more than $100,000 to operating costs.

Miscellaneous statistics for the year follow:

Passengers carried—interurban lines	9,378,866
Passengers carried—city lines	14,233,118
Total passengers carried	23,611,984
Freight handled (tons)	77,742
Express handled, exclusive of United States and Wells-Fargo express (tons)	7,781
Car miles operated—interurban lines	6,278,575
Car miles operated—city lines	2,156,798

Honolulu Rapid Transit & Land Company

The gross operating revenue of the Honolulu Rapid Transit & Land Company, Honolulu, Hawaii, for the year ended Dec. 31, 1914, amounted to $615,583, of which $602,842 consisted of revenue from transportation. This transportation revenue showed a decrease of $10,296 as compared to the results in 1913. The total operating expenses decreased by $3,448 to $367,794, giving a net revenue from operation of $247,788, a decrease of $6,692. The total deductions amounted to $103,215, a decrease of $13,594, so that the net revenue carried to surplus was $144,573, an increase of $6,902.

In comparison with 1913 the passenger traffic showed an increase of 145,918 fare passengers and 3833 free passengers, the total for 1914 being 12,241,032. In 1914 there were 2,878,719 transfers issued as compared to 3,466,750 in 1913. The freight traffic of 1913 fell off 10,376 lbs. The operating revenue in 1914 per car-mile was $0.313 and per car-hour $2.879, while the operating expenses per car-mile were $0.187 and per car-hour $1.720. In 1914 the company expended $12,582 for betterments and additions.

The falling off in revenue in 1914 was almost wholly attributed to the large increase in the number of automobiles of both a public and a private character put into service during the year.

CANADIAN ELECTRIC RAILWAY EARNINGS

The report of the Comptroller of Statistics on electric railway operation in Canada for the year ended June 30, 1914, shows that gross earnings from operation of all companies amounted to $29,691,007, while miscellaneous earnings totaled $3,503,104. Operating expenses amounted to $19,107,807, and taxes, funded debt, etc., to $4,756,055, leaving net income of $6,566,853. Other statistics were as follows: First main track mileage, 1560.82; total car-mileage, 98,517,808, and fare passengers carried, 614,709,819.

According to the Comptroller four operating lines, the Montreal Tramways, the St. John Railway, the Yarmouth Street Railway and the Pictou County Electric Company, submitted no reports for the year. These companies operate under provincial charters and believe that they are not required to report to any dominion department. In these cases it was necessary to insert figures for the preceding year. The other reports in general disclosed a year of financial progress by the electric railway interests in Canada.

The total operating expenses and miscellaneous charges, $23,863,862, deducted from the gross earnings from operation and the miscellaneous earnings, $33,194,111, gives an amount of $9,330,249. The discrepancy between this figure and the net income figure of $6,566,853 is caused by the fact that no items are included in miscellaneous charges for the Montreal Tramways and the St. John Railway.

FAVORABLE TAX DECISION

By a decision of the United States Circuit Court of Appeals at Cincinnati the government will be obliged to return to the Cincinnati Street Railway, the Dayton & Western Traction Company, the Columbus, Newark & Zanesville Electric Railway, the Fort Wayne, Van Wert & Lima Traction Company, and the Indiana, Columbus & Eastern Traction Company, about $100,000 collected from these companies under the old federal corporation tax law. The question in dispute was whether these companies carried on business within the meaning of the law. All the companies had leased their properties to other corporations, and the only business done by them was to collect and pay out the rentals under the leases. The Court of Appeals held that they transacted business only incidentally to that of their lessor companies, thus reversing the findings of the lower court.

Albuquerque (N. Mex.) Traction Company.—The District Court on June 4 ordered the foreclosure sale of the Albuquerque Traction Company, unless bonds with accrued interest and costs are paid within ninety days. The property will be offered by L. F. Lee, special master. The receivership of this company was noted in the ELECTRIC RAILWAY JOURNAL of May 22.

American Cities Company, New York, N. Y.—The directors of the American Cities Company have declared a semi-annual dividend of 1½ per cent on the company's cumulative preferred stock, payable on July 1 to holders of record on June 20. This compares with the full rate of 3 per cent paid from January, 1912, to January, 1915. President Hugh McCloskey has submitted a statement explaining the dividend reduction and attributing the decreased earnings for the subsidiary companies to the conditions resulting from the European war and to the inroads made by the jitneys. Inasmuch as the stock is cumulative, payment of the 1½ per cent now in arrears will be made as soon as such is justified by earnings.

Boston (Mass.) Elevated Railway.—The Boston Elevated Railway has awarded $1,000,000 of 5 per cent bonds, dated 1912 and maturing in 1942, to a banking syndicate composed of R. L. Day & Company, N. W. Harris & Company, Estabrook & Company, Blodgett & Company, Merrill, Oldham & Company and Curtis & Sanger. These bonds are part of a general issue of 5 per cent debentures, of which $4,000,000 are now outstanding. The proceeds will be used to cover a floating debt incurred for extensions and additions.

Camaguey (Cuba) Company, Ltd.—It is reported in Montreal that the offer to purchase $1,000,000 of capital stock of the Camaguey Company, Ltd., for $500,000, as noted in the ELECTRIC RAILWAY JOURNAL of June 12, is part of a plan to amalgamate a number of electric light and traction companies in the West Indies.

Columbus, Delaware & Marion Railway, Cincinnati, Ohio.—Judge Kinkead has taken under advisement the question as to whether the receiver of the Columbus, Delaware & Marion Railway should be authorized to issue $150,000 of receiver's certificates to meet obligations falling due on Aug. 1, or the company through a default in bond interest should be sold and reorganized. References were made to this company in the ELECTRIC RAILWAY JOURNAL of May 1 and June 12.

Fort Wayne & Springfield Railway, Decatur, Ind.—Edward M. McKinney, general freight agent of the Cincinnati, Bluffton & Chicago Railroad and a representative of F. A. Dolph, Chicago, states that a deal for the purchase of the Fort Wayne & Springfield Railway by Mr. Dolph and others who recently purchased the Cincinnati, Bluffton & Chicago Railroad, would in all probability be completed by July 4. Mr. McKinney said that the interurban line would become part of a system of a 420-mile electric system reaching into Ohio and northwestern Indiana, but details cannot be given out at this time. The receiver's sale of the traction company was noted in the ELECTRIC RAILWAY JOURNAL of May 22.

Interborough Rapid Transit Company, New York, N. Y.—The Appellate Division of the Supreme Court on June 11 confirmed the decision of the lower court in dismissing in December, 1913, the suit of Clarence H. Venner and his corporation, the Continental Securities Company, against the original directors of the Interborough Rapid Transit Company. The complaint charged fraud and extortion by August Belmont and other directors in connection with the organization of the Interborough company. The court, however, found no evidences of fraud, bad faith or the exaction of an exorbitant bonus by Belmont & Company. J. P. Morgan & Company have taken $5,000,000 of additional first and refunding 5 per cent bonds of the company, which makes a total of $103,356,000 issued to the bankers since the underwriting agreement was made. Of the amount thus far taken $52,600,000 has gone for refunding and the remainder for financing the construction of the new subways and extending the elevated lines.

Kanawha Traction & Electric Company, Parkersburg, W. Va.—The stockholders of the Kanawha Traction & Electric Company and the Parkersburg, Marietta and Interurban Railway have approved a proposition to merge the two companies under the name of the former with a capitalization of $3,000,000. The new company will operate the city lines in Parkersburg, W. Va., and in Marietta, Ohio, as well as the interurban line operating between these cities and to Lowell and Beverly, Ohio. The Kanawha Traction & Electric Company was originally incorporated in West Virginia to build an electric railway in Parkersburg from a point on the west bank of the Ohio River to extend by the most practicable route to a point at or near Murdock Avenue, as noted in the ELECTRIC RAILWAY JOURNAL of May 8. The consolidated company has sold $1,000,000 of notes to a syndicate formed by the Fidelity Trust Company, Baltimore.

National Securities Corporation, Boise, Ida.—The Idaho Public Service Commission has authorized the amalgamation of the Idaho-Oregon Light & Power Company, the Idaho Railway, Light & Power Company, the Idaho Power & Light Company, the Great Shoshone & Twin Falls Water Power Company, the Southern Idaho Water Power Company and other electric generating and distributing companies in southern Idaho into the National Securities Corporation, organized by Electric Bond & Share Company interests. The commission states that the plans of the National Securities Corporation are lawful and their consumation will prove beneficial to holders of the securities of the old companies as well as to the consumers of their service and will improve the state of their credit. The National Securities Corporation was formed early in the current year with $21,000,000 of stock. Previous details were published in the ELECTRIC RAILWAY JOURNAL of April 17.

New York, Westchester & Boston Railway, New York, N. Y.—The New York, Westchester & Boston Railway has been incorporated in New York State with $6,000,000 of authorized capital stock, to complete the corporate union of the present company of the same name and the Westchester Northern Railroad. The details of this amalgamation were published in the ELECTRIC RAILWAY JOURNAL of June 5.

New York (N. Y.) Railways.—Clark, Dodge & Company, New York, are offering at 95 and interest, to yield about 5.3 per cent, part of the $1,500,000 of improvement and refunding mortgage (closed) 5 per cent gold bonds of the Twenty-third Street Railway. These bonds are due on Jan. 1, 1962, and are redeemable, all or in part, at 107 and interest on any interest date on four weeks' notice.

Pacific Electric Railway, Los Angeles, Cal.—The California Railroad Commission has extended to Jan. 1, 1916, the time within which the Pacific Electric Railway may issue $1,554,000 of refunding mortgage fifty-year bonds, this being the unsold portion of $2,942,000 authorized on Nov. 23, 1914. The commission has also given the company until Jan. 1, 1916, to issue $1,866,000 of these bonds, the unsold portion of $6,839,000 authorized in the latter part of 1914.

Pacific Gas & Electric Company, San Francisco, Cal.—It is announced that the board of directors of the Pacific Gas & Electric Company will meet on June 30 and declare a common stock dividend of 6 per cent to be issued in two installments, one-half on July 15 and one-half on Dec. 15, to holders of record on June 30, in certificates for whole shares of fully paid new common stock and warrants for fractional parts of such shares, exchangeable at par for stock certificates for integral numbers of shares but not bearing interest or entitling the holder to participate in dividends prior to exchange for stock certificates. The total amount of common stock to be distributed amounts to $1,926,600, and represents an equivalent amount of bonds retired with earnings, through the operation of sinking funds, since Jan. 1, 1914. The company's total outstanding capitalization will not be increased as a result of this distribution. It is said to be the expectation of the board of directors to continue similar distributions of common stock from year to year in addition to such cash dividends as the earnings of the company and general financial conditions may warrant. As the obligatory bond retirements are running at the rate of about 2½ per cent per year of the total amount of common stock outstanding, it is anticipated that the portion of such dividends which may be paid in common stock in future will be approximately at this rate. It has been the practice of the company for a number of years to set aside each year a portion of earnings as a reserve for depreciation. The amount to be so set aside this year will be $100,000 per month, or $1,200,000 for the year. The company makes this statement to remove any possible apprehension that the policy above outlined will disturb the present relation between assets and issued capital.

Public Service Newark Terminal Railway, Newark, N. J.—The Fidelity Trust Company, Newark; Drexel & Company, Philadelphia, and Clark, Dodge & Company, New York, are offering at 95½ and interest $5,000,000 of first mortgage (closed) sinking fund forty-year 5 per cent gold bonds of the Public Service Newark Terminal Railway. These bonds are dated June 1, 1915, and are due on June 1, 1955. They are unconditionally guaranteed jointly and severally as to principal, interest and sinking fund by the Public Service Railway and the Public Service Corporation of New Jersey. They are redeemable as a whole at 105 and interest on June 1, 1920, or on any interest date thereafter on six weeks' notice, and are also callable for the purposes of the sinking fund on June 1 of each year, beginning with June 1, 1920, at 102½. This company was incorporated under the laws of New Jersey to construct and operate the new electric railway terminal in Newark.

St. Joseph Valley Railway, Elkhart, Ind.—The St. Joseph Valley Railway has been authorized by the Ohio Public Utilities Commission to issue $10,000 of common capital stock to be sold for the highest price obtainable but for not less than par. The proceeds are to be applied to the payment of applicant's indebtedness incurred in the construction of its line of railway from the Indiana and Ohio State line eastward into Ohio.

San Francisco-Oakland Terminal Railways, Oakland, Cal.—It is reported that a committee of twelve, representing various persons and corporations interested in the San Francisco-Oakland Terminal Railways and its subsidiary corporations, has been formed to consider the present financial condition of the company and its problems. If three-fourths of the members of the committee approve a general financial plan for the reorganization of the corporation, it will then be made public and a reorganization committee will be selected to take steps to put such a plan into effect. The committee of twelve hopes to have a reorganization and refinancing plan ready to submit to the security holders within a comparatively short time. A statement from the board of directors showing why a readjustment is essential was abstracted in the ELECTRIC RAILWAY JOURNAL of June 5.

Syracuse & South Bay Electric Railroad, Syracuse, N. Y.—It is reported that the properties of the Syracuse & South Bay Electric Railroad and of the Syracuse, Watertown & St. Lawrence River Railroad will be sold at foreclosure in about sixty days in order to make way for a reorganization proceeding. The appointment of Ernest Gonzenbach as receiver of these companies and details concerning the reorganization plan were noted in the ELECTRIC RAILWAY JOURNAL of May 29.

Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia.—The Waterloo, Cedar Falls & Northern Railway has filed an amendment to its articles of incorporation to cover an increase in its capital stock from $2,250,000 to $5,000,000. The capital stock is to be divided into 16,650 shares of preferred stock and 33,350 shares of common stock, par value $100. The amendment also provides for an increase in the number of executive officers. Heretofore the company has had a president, one vice-president, a secretary, a treasurer, an auditor and a general counsel. By the amendment the company is authorized also to elect "one or more vice-presidents," and an assistant secretary.

West Virginia Traction & Electric Company, Wheeling, W. Va—William Morris Imbrie & Company and William P. Bonbright & Company, New York, are offering at 98 and accrued interest, to yield about 7.1 per cent, $1,500,000 of two-year 6 per cent collateral trust notes of the West Virginia Traction & Electric Company, dated June 1, 1915, and due on June 1, 1917. These notes are callable at 100½ and accrued interest on forty days' notice. They are a direct obligation of the company and are secured by the pledge and deposit of the entire outstanding $1,875,000 of its first refunding and improvement mortgage thirty-year 6 per cent gold bonds. The bonds thus deposited are a general lien upon all the property of the company and its subsidiaries, subject to the prior lien of $3,123,000 of divisional bonds, for the retirement of which bonds of this issue are reserved.

Worcester & Warren Street Railway, Brookfield, Mass.—It is announced that the Warren, Brookfield & Spencer Street Railway has changed its name to the Worcester & Warren Street Railway. No changes have been made in officials or employees. The foreclosure sale of this company was noted in the ELECTRIC RAILWAY JOURNAL of April 17.

DIVIDENDS DECLARED

American Cities Company, New York, N. Y., 1½ per cent, preferred.

Bangor Railway & Electric Company, Bangor, Maine, quarterly, 1¾ per cent, preferred.

Capital Traction Company, Washington, D. C., quarterly, 1¼ per cent.

Cleveland (Ohio) Railway, quarterly, 1½ per cent.

Duluth-Superior Traction Company, Duluth, Minn., quarterly, 1 per cent, preferred.

Eastern Texas Electric Company, Beaumont, Tex., 3 per cent, preferred.

Illinois Traction System, Peoria, Ill., quarterly, 1½ per cent, preferred.

Manila Electric Railway & Lighting Corporation, Manila, P. I., quarterly, 1½ per cent.

New Orleans Railway & Light Company, New Orleans, La., quarterly, 1¼ per cent, preferred.

Northern Ohio Traction & Light Company, Akron, Ohio, quarterly, 1½ per cent, preferred.

Springfield Railway & Light Company, Springfield, Mo., quarterly, 1¾ per cent, preferred.

Toronto (Ont.) Railway, quarterly, 2 per cent.

Twin City Rapid Transit Company, Minneapolis, Minn., quarterly, 1¾ per cent, preferred; quarterly, 1½ per cent, common.

Union Passenger Railway, Philadelphia, Pa., $4.75.

Union Traction Company, Philadelphia, Pa., $1.50.

United Traction & Electric Company, Providence, R. I., quarterly, 1¼ per cent.

West Philadelphia (Pa.) Passenger Railway, $5.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
AMERICAN RAILWAYS, PHILADELPHIA, PA.					
1m., May, '15	$448,672	.....	.....	.....	.....
1 " " '14	487,461	.....	.....	.....	.....
5 " " '15	2,130,304	.....	.....	.....	.....
5 " " '14	2,195,560	.....	.....	.....	.....
BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.					
1m., Apr., '15	$7,407	*$8,431	†$1,024	$1,111	†$2,135
1 " " '14	8,338	*8,545	†207	1,081	†1,288
12 " " '15	121,522	*101,198	20,324	13,374	6,950
12 " " '14	121,655	*100,919	20,735	12,922	7,813
CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, MAINE					
1m., Apr., '15	$186,786	*$111,821	$74,965	$70,403	$4,562
1 " " '14	186,634	*115,608	71,026	63,745	7,281
12 " " '15	2,543,812	*1,437,484	1,106,328	762,960	343,368
12 " " '14	2,407,857	*1,384,718	1,023,139	741,474	281,665
EASTERN TEXAS ELECTRIC COMPANY, BEAUMONT, TEX.					
1m., Apr., '15	$50,669	*$29,484	$21,185	$8,728	$12,457
1 " " '14	52,519	*32,365	20,154	8,212	11,941
12 " " '15	669,127	*389,105	280,022	103,868	176,154
12 " " '14	542,580	*344,953	197,627	88,639	‡136,190
EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.					
1m., Apr., '15	$193,827	*$119,538	$74,289	$60,996	$13,293
1 " " '14	213,998	*143,327	70,671	55,708	14,963
12 " " '15	2,531,939	*1,519,661	1,012,278	737,802	274,476
12 " " '14	2,745,570	*1,701,837	1,043,733	607,090	436,643
GRAND RAPIDS (MICH.) RAILWAY					
1m., Apr., '15	$83,353	*$67,025	$16,328	$13,702	$2,626
1 " " '14	101,454	*67,016	34,438	13,538	20,900
12 " " '15	1,258,480	*835,100	423,380	162,162	261,218
12 " " '14	1,300,544	*825,407	475,137	161,446	313,691
LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, MAINE					
1m., Apr., '15	$53,817	*$35,755	$18,062	$15,681	$2,381
1 " " '14	49,773	*37,748	12,025	15,567	†3,542
12 " " '15	696,011	*459,466	236,545	187,161	49,384
12 " " '14	674,730	*451,953	222,777	183,115	39,662
NASHVILLE RAILWAY & LIGHT COMPANY, NASHVILLE, TENN.					
1m., Apr., '15	$176,040	*$103,949	$72,091	$41,992	$30,099
1 " " '14	186,150	*116,394	69,756	41,338	28,418
12 " " '15	2,216,599	*1,294,976	921,623	491,119	430,504
12 " " '14	2,228,645	*1,404,493	824,152	480,219	343,933
PORTLAND (MAINE) RAILROAD					
1m., Apr., '15	$75,238	*$50,816	$24,422	$24,309	$113
1 " " '14	77,306	*50,147	27,159	21,435	5,724
12 " " '15	1,048,915	*643,385	405,530	258,014	147,516
12 " " '14	1,039,980	*658,453	381,527	229,184	152,343
PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.					
1m., Mar., '15	$445,544	*$266,308	$179,236	$183,854	†$4,618
1 " " '14	547,393	*280,263	267,130	117,185	89,945
12 " " '15	5,978,042	*3,221,351	2,756,691	2,196,100	560,591
12 " " '14	6,763,416	*3,322,134	3,441,282	2,067,420	1,373,862
TAMPA (FLA.) ELECTRIC COMPANY					
1m., Apr., '15	$81,176	*$42,739	$38,437	$4,376	$34,061
1 " " '14	79,258	*44,590	34,668	4,454	30,214
12 " " '15	993,778	*510,893	482,885	52,988	429,897
12 " " '14	907,485	*505,862	401,623	55,851	345,772

*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

THE JITNEY BUS

Terms of New Springfield and Portland Regulatory Ordinances Are Summarized

Springfield, Mo., has amended its jitney ordinance to accord with the decision of the courts in the case brought to have the municipal law declared unconstitutional. The amended ordinance provides that jitneys shall display the name of the party operating it and the route and destination, shall be lighted after dark and shall not exceed in speed 4 m.p.h. when approaching a crossing, 6 m.p.h when turning a corner of any intersecting streets, 8 m.p.h. when passing intersecting streets, 8 m.p.h. on streets within the business district and 15 m.p.h. otherwise. The penalty for the violation of the ordinance is a fine of from $10 to $100, or imprisonment from five to sixty days or both. The amended ordinance also provides that conviction for drunkenness or for a violation of the provisions of traffic ordinances shall act as a forfeiture of a motor-vehicle license, which will not thereafter be reissued for six months. The main feature of the ordinance is a provision for a $2,000 indemnity bond, which provision was indorsed by the courts.

The Portland, Ore., jitney measure, the approval of which by the voters was noted in the ELECTRIC RAILWAY JOURNAL of June 12, was carried by a vote of 22,115 yeas against 14,284 noes. No indemnity bond of any kind or in any amount is required, and the jitneys need operate only from 6 to 10 a. m. and 3 to 11 p. m. Railway cars, autos used exclusively for sightseeing, hotel buses and taxicabs are not considered motor-buses within the meaning of the grant. Licenses must be secured with the approval of the Commissioner of the Department of Public Utilities of the city. The route set forth in the license is not to be transferred or assigned without the consent of the commissioner. The rate of fare is not to be more than 5 cents. Stops are to be made on the near side. The number of passengers to be carried is limited to the registered seating capacity of the car. Cars must be submitted to the city for inspection every thirty days. Interiors must be lighted at night. Small license fees are fixed. The fine is $100 for conviction for the violation of any provisions of the measure.

In Kansas City, Mo., there has been a renewal of the effort to get a jitney ordinance passed. The Council committee having the matter in hand met a few days ago to consider anew the form the ordinance should take. Interest in the subject has been renewed mainly by the recently-formed transportation companies which are operating buses on the boulevards and feel that their business would be improved by weeding out the irresponsible small-car jitney operator, who does not operate at all during the quiet hours and has no fixed route when he does operate. A representative of one of the leading jitney companies is quoted as having said to the Council committee that his company and others were voluntarily taking out bonds for the protection of their drivers and property and for the safety of their patrons and the public. He declared himself in favor of bonding those in the business, of establishing routes for the various lines and of compelling strict adherence to them. The committee, however, did nothing and it is considered unlikely that there will be an agreement soon on anything that will serve any important purpose.

C. W. Ferguson, state manager of the Pacific Coast Casualty Company, Seattle, which is bonding jitney operators in the sum of $2,500 each, recently announced that bonding rates would be increased 25 per cent to 50 per cent after June 10. The company has bonded about 600 machines in Washington. The increase in the number of accidents has caused the advance in the insurance rates.

Charges of violating the city speed ordinance regulating street cars were preferred recently against ten motormen in the employ of the Puget Sound Traction, Light & Power Company in Seattle by R. J. Miller, president of the Auto Drivers' Association. On the same day E. H. Worthen, investigator for the Puget Sound Traction Company, applied for warrants against nineteen drivers of jitneys on the charge of violating the bonding law.

GEORGIA JITNEY RULING

Opinion of Commission Regarding Regulation—Rules Prescribed for Operation

In its ruling assuming jurisdiction over the jitney the Railroad Commission of Georgia said in part:

"We repeat that in order for this commission fairly, justly and intelligently to regulate the street railroad company's business and intelligently to decide whether such service is adequate it is essential that the commission have the same power of regulation over other public service operators in competition with street railways over the same routes. This is in the interest of the public and not of the street railroad company.

"Passenger transportation service, to be of value to the public, must be regular and dependable. No common carrier in this State now under the regulatory supervision of this commission is allowed to discontinue temporarily or abandon permanently any established service without the consent of this commission. No one questions the wisdom of this regulation.

"The same regulation ought to apply to the jitney, if it holds itself out as a common carrier and expects to establish itself in the confidence of the public as a dependable transportation agency.

"We have attempted to demonstrate that respondents in this complaint not only come within the letter of the law prescribing the jurisdiction of this commission, but also clearly within its spirit and general scope, and that there is plain need of some governmental supervision and regulation of their business. . . . Motor car transportation, in our opinion, has come to stay, and hence all the more the necessity for regulation. Proper and reasonable regulation does not mean, nor should it be exercised, for prohibitory or strangulation purposes.

"These public servants, like their competitors, the steam and street railroad companies, are entitled to fair treatment, to reasonable fares and sane regulation. Observation by members of the commission of the operation of jitneys in Atlanta, and of their practices, has convinced us that supervision and regulation are essential to the public safety and welfare, and, believing under the act of 1907 that it is made our duty to exercise supervision over the conduct of their business, we shall do so, and from time to time prescribe such just and reasonable regulations as seem to us demanded. In doing this, it is neither our desire nor purpose to interfere with or supersede the police powers of local authorities or their powers or duties in reference to license or other forms of taxation."

Tentative rules have been prepared by the commission and will form the basis of discussion at a hearing to be held on July 13. These rules follow:

"(a) Each and every person, firm, company or corporation owning or operating any automobile, auto-bus, auto-truck or other motor vehicle for the transporting for hire of passengers over any definite route, highway, street or streets, or between definite points, places or terminals, in any town or city within this State, or between any towns or cities within this State, shall observe and obey in the conduct of their public business the following rules and regulations hereby prescribed by the Railroad Commission of Georgia for the government of the business of each and all such common carriers of passengers:

"(b) Provided that these rules and regulations shall not be construed to apply to the owners or operators of automobiles, auto-buses, auto-trucks or other motor vehicles operating and using the same in the service of hotels for transporting their patrons, nor to the owners or operators of automobiles or other motor vehicles or cars operated or used for hire to one or more individuals for individual, special or exclusive transportation service.

"Each and every person, firm, company or corporation owning or operating any public motor vehicle, as defined and described in Section A, Rule 1, prior to or simultaneously with the beginning of operation as mentioned in said Rule 1, shall file with the Railroad Commission of Georgia a typewritten declaration or statement showing:

"(a) The name and business address of the carrier filing.

"(b) If a corporation, the names and addresses of its executive officers, with a certified copy of its charter.

"(c) If a firm, the names and addresses of the members or partners thereof.

"(d) The number of vehicles to be operated, the makers thereof, the State license numbers for each, and the manufacturer's rated seating capacity of each.

"(e) The name or names of the driver or drivers of each car and the age of each driver.

"No person under eighteen years of age shall be allowed to operate or drive, while in public use, any public motor vehicle as defined or described in Section A of Rule 1.

"(f) The route or routes, highway or highways, street or streets over which, and the terminals or points between which, the owner or operator proposes to conduct the business of a common carrier of passengers, and whether such service is to be daily or otherwise.

"(g) A certified copy of the city license for each vehicle, owner, operator or driver as the case may be, in any city or cities where licenses are required.

"(h) The fare or rate desired to be charged.

"No passenger shall be allowed to ride on the running boards or elsewhere on any public motor vehicle as defined and described in Section A, Rule 1, while in the public service, except within the tonneau, or seated by the side of the driver.

"Not more than two persons in excess of the manufacturer's rated seating capacity shall be allowed on any public motor vehicle as defined and described in Section A, Rule 1, at one and the same time; provided that children under five years of age, in arms, need not be counted.

"No fare or fares shall be collected by the driver while a vehicle is in motion, but all fares shall be collected, when taken by a driver, prior to the starting of the vehicle or after it has been brought to a full stop.

"Public motor vehicles as defined and described in Section A, Rule 1, shall be regularly and continuously operated over the route or routes designated and filed with this commission by the owners or operators, or as included and designated in municipal licenses where required, unless prevented by causes beyond the control of such owners or operators, between the hours of 6 a. m. and 11 p. m. within incorporated cities; and where operated between designated cities or towns, as near as practicable upon regular schedules, information as to which shall be given to the public by printed card or circular, one copy of which shall be posted and kept posted at a conspicuous place at each terminal of the route. One copy of each schedule or time table required in this rule shall be mailed to the office of the commission.

"No person, firm, company or corporation, after having filed with the Railroad Commission the declaration or statement required in Rule 2, unless from causes beyond his or their control, shall discontinue such public service or withdraw his or its facilities from any designated route or service, except after the expiration of twenty-four hours after written notice of intention so to do shall have been filed with the Railroad Commission of the contemplated discontinuance of service or withdrawal of facilities.

"Each motor vehicle as defined and described in Section A, Rule 1, when in operation in public service, shall plainly indicate in suitable print on an attached sign the terminals between which and the route over which it is being operated.

"Nothing in these rules shall be construed so as to interfere with the lawful police regulations of any municipality of this State in reference to the uses of the public highways of such municipalities, or with any lawful requirement as to business licenses, or taxation, nor to authorize any person, firm, company or corporation to carry on the business of a common carrier of passengers upon, over or through the streets or upon the public places or highways of any municipality in this State, without first complying with the lawful ordinances of such municipality concerning the same."

PARTICIPATION PLAN PROPOSED IN LEXINGTON

Employees, union or non-union, of the Kentucky Traction & Terminal Company, Lexington, Ky., will be placed on a co-operative, profit-sharing basis beginning on July 1, if the contract read to more than forty of the company's conductors and motormen at the company's office recently is approved by the men. The present contract between the company and the men expires on July 15, and it is proposed by F. W. Bacon, vice-president of the company, to substitute the profit-sharing plan. The proposed contract would increase the wages of the conductors and motormen 1 cent an hour immediately and would set aside 18.5 per cent of the gross earnings derived from freight and passenger traffic for the payment of the wages of the trainmen and the costs of the claim department, except as to fees paid to attorneys, adjusters and surgeons.

If during the fiscal year ending June 30, 1916, the amount paid for wages and legal expenses do not exceed 18.5 per cent of the gross revenues of the company, derived from the transportation of passengers and freight, the amount paid to conductors and motormen is to be increased 1 cent an hour for the fiscal year beginning July 1, 1916. If during succeeding years the amount paid out for claims and wages does not exceed 18.5 per cent of the gross receipts, the saving is to be apportioned among the trainmen as increases in wages, while in case the amounts paid out exceed 18.5 per cent, the trainmen are to submit to a reduction in wages, though at no time are they to be paid less than the rate for the year beginning July 1, 1915, which is an increase of 1 cent an hour.

The contract, if accepted by the men, will take the place of the present contract and will continue in force for three years from July 1, 1915.

Ninety-two of the 125 motormen and conductors have signed the agreement submitted to them by Mr. Bacon.

TORONTO SERVICE PROBLEM

Transportation matters occupied the attention of the Board of Control of Toronto, Ont., for several hours on June 8. The most perplexing problem which confronted the members was the policy to be adopted in regard to the operation of the Metropolitan radial line of the Toronto & York Radial Railway south of Farnham Avenue after the expiration of the franchise at midnight on June 16. The company is anxious to arrange with the board for some form of compromise which will enable it to continue the operation of its Yonge Street service to the terminal at the Canadian Pacific Railway crossing. It is possible the company may be permitted to run its passenger cars over the tracks on sufferance from day to day, until the Council finally decides on its policy for dealing with the traffic problem in the suburban districts.

It has been decided by the city to take over the line from Farnham Avenue, but it cannot be utilized for the Toronto Civic Railway, unless an arrangement is entered into with the radial company. The comptrollers will not recommend the Council to sanction anything but a temporary arrangement until after the report on the rapid transit and hydro-radial systems, now in the course of preparation, has been presented and considered. What action the management of the Toronto & York Radial Railway will take cannot yet be ascertained, but it is thought the company will refuse to allow the city to run its cars over the tracks unless the company is permitted to run freight cars to the present terminals. Consequently residents of North Toronto and the suburban districts may have to walk to reach the Toronto Railway cars at the Canadian Pacific Railway crossing. The situation is complicated by the fact that the Toronto Railway is entitled to operate its cars up Yonge Street to Farnham Avenue. So far it has refused to operate beyond the Canadian Pacific Railway tracks. Mayor Church is inclined to recommend the Council to order the company to extend its service up to Farnham Avenue. If it refuses to do so after reasonable notice, the city can operate cars over the line.

PENSION SYSTEM AT HAMPTON, VA.

The Newport News & Hampton Railway, Gas & Electric Company put into force on June 1 a pension system for superannuated employees. Any employee is eligible who has reached the age of seventy years, or is between seventy and sixty years and has been continuously in the service of the company for more than twenty-five years and has become physically disqualified for such service, or has been continuously for twenty-five years or more with the company and has become physically disqualified by reason of injury received while in the discharge of his duties. The system is limited, however, to those whose maximum wages have not exceeded $1,800 per annum for a period of more than ten years, prior to retirement. The pension is based

on an allowance of 1 per cent of the average yearly pay received during the last ten years of service preceding retirement for each year of service with the company, the minimum pension being $240 per annum. Thus an employee would receive 25 per cent of his annual wages as a pension if he had been with the company twenty-five years. The company, through its welfare board, reserves the right to discontinue the plan or to revoke any pension as it may desire.

At the same time that it announced its pension plan the company made public a statement in regard to an insurance plan under which all employees now under sixty years of age who have been in the employ of the company continuously for three years and all employees, on completing three years of continuous service with the company, will be entitled to life insurance to the amount of $1,000 for white employees and $500 for colored employees.

Near-Side Stops in Springfield.—Mayor T. K. Bowman of Springfield, Mo., has signed the ordinance, passed by the City Council, which provides for the stopping of all street cars on the near side of the intersections of all paved streets in the city.

Charging for Packages.—The State Public Service Commission of Washington has ordered the Seattle, Renton & Southern Railway, operating in Seattle, not to charge passengers for packages which they carry with them on the cars. The road has been making a fixed charge of 10 cents for each package taken on the car by a passenger. The patrons protested against the charge, and the city, through the office of the Corporation Counsel, asked that an order be made prohibiting the charge.

Through Service Between Gary and Chicago.—The Gary & Interurban Railroad, Gary, Ind., operating 85 miles of road in northern Indiana, has made a contract with the Hammond, Whiting & East Chicago Railway whereby through cars will be run from Gary to Chicago. The Hammond, Whiting & East Chicago Railway is owned by the same interests as the Chicago Surface Lines, and through cars from Gary will run into a Chicago terminal at Sixty-third Street and Madison Avenue.

Ferry-Car Transfers Continued.—The Board of Estimate and Apportionment of New York City has approved the report of the transit committee to continue the system of transfers between the Staten Island municipal ferry and the lines of the New York Railways for the coming six months. The division of the fare is on the basis of 3 cents to the company and 2 cents to the city. The arrangement is in the nature of a concession to the residents of Staten Island under the new rapid transit arrangement.

Hearing on Stops in St. Louis.—The hearing before the Public Service Commission of Missouri on the application of the United Railways, St. Louis, to that body for permission to eliminate more than 700 stops was begun at the Planters' Hotel on June 11. Bruce Cameron, superintendent of transportation, was the principal witness for the company. He outlined the advantages of the plan proposed and exhibited samples of "car stop" and "no stop" signs which the company proposes to install if its application is granted.

Car Capacity Ordinance Upheld.—The order of Dr. S. S. Goldwater, commissioner of health of New York, to the Brooklyn Rapid Transit Company limiting the number of street-car passengers to one and one-half times the seating capacity of cars, has been upheld in the Court of Special Sessions in Brooklyn. Jacob Horowitz was adjudged guilty of violating the sanitary code for persisting in boarding a Third Avenue car which already contained forty-eight passengers, the maximum permitted under the ordinance. Sentence was suspended.

Increase in Wages on Suburban Line.—The employees of the Hartford & Springfield Street Railway, Wharehouse Point, Conn., have been granted an increase in wages. In future all men in the employ of the company five years or more will receive 28½ cents an hour, and all under five years will be paid accordingly, rating from 23 cents an hour for those employed one year or less, with a gradual increase each year until the maximum of 28½ cents an hour is reached. The new scale of wages will go into effect on July 1 for one year.

Re-routing in Baltimore.—Mayor Preston of Baltimore, Md., has suggested the appointment of a commission to consider the question of rerouting cars of the United Railways & Electric Company. He would have the commission consist of a member of the board of estimate, representing the Mayor and the City Council; a member of the Maryland Public Service Commission; an official of the railway, and a representative of the public. Thomas A. Cross, manager of the company, has stated that the company would gladly co-operate with such a body.

John Barleycorn and Traffic.—There has been a noticeable increase in passenger traffic on the Louisville & Interurban line, which connects Shelbyville, Ky., and Louisville, since the saloons in Shelbyville were closed. Ticket sales on Saturday, June 5, totaled $157, compared with total sales of $38.40 for the last Saturday during which the saloons were open in Shelbyville. On the Saturday night in question fifty tickets were sold to Eight Mile House, the first "wet" spot between Shelbyville and Louisville. On the latter Saturday, when Shelbyville was still wet, no tickets were sold to the roadhouse in question.

Refrigerator Service.—The Illinois Traction System, Peoria, Ill., has inaugurated a refrigerator service between St. Louis and points on its line in Illinois. At present two iced refrigerator cars depart from the Twelfth Street and Lucas Avenue depot in St. Louis each Monday and Wednesday, destined for Springfield and stations south. One car carries shipments to Mount Olive, Litchfield and Hillsboro, and the other to Benld, Gillespie, Carlinville, Nilwood, Girard, Virden, Thayer, Auburn, Chatham and Springfield. Tonnage so far consists almost entirely of meat, most of which was heretofore shipped by express.

New Hampshire Crossing Law.—New Hampshire has just passed a law requiring every city and town to maintain a warning sign on every highway approaching a crossing at a reasonable distance on each side of the crossing. Under the act grade crossing protection is put in the hands of the Public Service Commission. That commission has ordered that enamel metal signs 24 in. x 12 in., white letters on a blue ground, shall be placed at varying distances from grade crossings. If any town for sixty days neglects to comply with the commission's order, it forfeits $1 for each day. Anyone injuring these signs is liable to a fine of $10.

Indiana Safety-First Banquet.—Ninety men connected with the Union Traction Company of Indiana enjoyed the hospitality of the company at the June safety-first banquet at the Doxey Hotel, Anderson, on the evening of June 4. Interesting and instructive talks along the lines of extending the safety-first movement were made by A. W. Brady, president of the company; H. A. Nicholl, general manager; C. A. Baldwin, superintendent of transportation; S. R. Dunbar, purchasing agent; E. E. Slick, claim adjuster, and several others. The winning safety-first essays were read by E. H. Mitchell, George E. F. Kincaid and A. C. Bounsall. Essays written by these employees were selected as prize winners from among thirty-two papers.

Improved Service to Boston Beach Resorts.—Rapid transit to Revere Beach from Boston, Mass., will be inaugurated next month as the result of an operating agreement between the Boston Elevated Railway and the Bay State Street Railway, associated with the opening for service of the West End extension of the East Boston tunnel. Through service to and from this resort, which is sometimes visited by 100,000 persons on warm Sundays and holidays, will be afforded by the construction of the tunnel extension, supplemented by the building of a new line on a private right-of-way east of Belle Isle inlet, with a trestle bridge capable of carrying 50-ton cars. Crews will be changed in East Boston, and service on the Boston Elevated system to and from the beach will be established on an 8-cent check basis.

Helping the Commerce Club.—The St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., working in close harmony with the Commerce Club, has for the last three months, while the Commerce Club was exploiting various campaigns, joined in the movements by displaying appropriate posters in its street cars. The posters are printed in colors on sheets 21 in. by 28 in. In the clean-up campaign particularly did the company render excellent service. The posters were attached in pairs to the windows

of the cars, one pair on each side of the car. One sheet of the pair was exposed to the passengers, and the outside sheet of the pair was exposed to the passers-by on the street—or those passed by. Another poster recently used backed up the local campaign to "Trade with Your Merchants in St. Joseph." H. C. Porter, commercial manager of the company, is third vice-president of the Commerce Club, and on its active committees.

The Safety-First Traffic Rules.—Brief reference was made in the ELECTRIC RAILWAY JOURNAL of June 12, page 1137, to the twenty recommendations concerning street traffic regulation prepared by the street traffic committee of the Safety First Federation of America at its meeting in Detroit on June 4 and 5. It was decided at the Detroit meeting to communicate with C. Loomis Allen, chairman of the Federation's transportation committee, also president of the American Electric Railway Association, with the request that a sub-committee be appointed to confer with the street traffic committee with the view to the adoption of some of the suggestions, which it is believed would make for the greater convenience and safety of the patrons of the street railway lines. Among the members of the street traffic committee of the federation are Joseph A. McGowan, auditor of the Indianapolis Traction & Terminal Company, and F. W. Bacon, vice-president of the Kentucky Traction & Terminal Company.

Bridge Material by Electric Railway.—In sharp competition with two steam roads, good pike roads and motor trucks, the Louisville & Interurban Railroad, Louisville, Ky., has won the contract for transporting the materials to be used in a big concrete bridge being constructed by the county east of Louisville. The site of the bridge is 6 miles from the end of the Fern Creek line of the railway, and the sand and gravel, cement and steel, will be hauled from that place by the trucks of the contractor, the Hoke Company. The sand and gravel will be taken from the bins of the Ohio River Sand Company, which are located on the tracks of the Louisville Railway at Thirty-first Street and Broadway, and it is probable that the cement will be delivered to the railway at the end of its Orell line, which will mean a haul of about 30 miles by car. There will be about 1,500 barrels of cement. The sand and gravel will be delivered by trains of four cars each, each car holding thirty-five cubic yards. These are side dump cars and will dump at the end of the line, the contractor having thus to handle his materials only once.

Safety First Discussed in Louisville.—What the safety-first work of the Louisville (Ky.) Railway has accomplished is illuminatingly indicated in a recent statement made by Dr. Ellis Duncan, coroner of Jefferson County. Speaking before the members of the Louisville Rotary Club at that club's last meeting, when consideration was concentrated on the electric railway interests, Dr. Duncan said that the records of his office show that in former years the fatal accidents to be charged to street railway operation in that county ranged between twelve and fourteen each year. Last year, 1914, when the Louisville Railway began its safety-first work in earnest, the record was reduced to only four deaths, while for what is practically half of 1915 there has not been a fatal accident. Samuel Riddle, superintendent of transportation of the company, went further than Dr. Duncan when he stated that there had not been a fatal accident chargeable to the company since last August. Mr. Riddle is the electric railway representative of the Louisville Rotary Club and, in accordance with the plan by which all the members take their turns in "boosting" their special interest, Mr. Riddle discussed the work of the company in the direction of accident prevention and asked for co-operation of his fellow Rotarians in getting results. Three speakers supported him, Dr. Edward Grant, city health officer; Dr. Joseph W. Fowler, superintendent of the City Hospital, and Dr. Duncan, the coroner. The principal address of interest was that of Dr. Duncan, who suggested that the civic and commercial organizations of the city further a movement looking toward the appointment of a safety commissioner by the city, after the plan followed in Chicago, to investigate accidents and determine causes, as well as outline plans by which they might be prevented. Mr. Riddle expressed his approval of the proposal and it is expected that definite will be obtained.

Personal Mention

Mr. Frank Sullivan Smith has been elected a member of the executive committee of the American Light & Traction Company, New York, N. Y., to succeed the late Gen. Thomas Hubbard.

Mr. J. H. Merrill, Youngstown, Ohio, has been appointed purchasing agent of the Rockford & Interurban Railway and the Rockford (Ill.) City Traction Company, to succeed Mr. Charles A. Ingle, who resigned some time ago.

Mr. Emerson McMillin, chairman of the board of the American Light & Traction Company, New York, N. Y., has also been elected chairman of the executive committee of the company to succeed the late Gen. Thomas Hubbard.

Mr. Charles F. Wallace was elected president of the Stone & Webster properties at Dallas, Tex., known as the Rapid Transit Railway and the Dallas Electric Light & Power Company, at the annual meeting of these companies on June 10.

Mr. John W. Brown has been appointed by the Kansas City Court of Appeals to succeed himself as the representative of Kansas City on the board of directors of the Kansas City Railways, the company which will have control of the street railways of Kansas City if the new franchise is accepted. Mr. Wagner's term had expired. Mayor Jost nominated him and two others as a list from which the Court of Appeals might name a representative.

Mr. R. W. Berliner, who for the last two years has been general maanger of the Colonial Power & Light Company, the Claremont Railway & Lighting Company and the Claremont Power Company, all of Claremont, N. H., has been appointed engineer in charge of general construction work in the South and East for the Eastern Power & Light Corporation, which controls the Claremont companies. Mr. Berliner's headquarters after July 1 will be in New York Citiy.

Mr. Byron T. Burt, who resigned as general manager of the Chattanooga & Tennessee River Power Company early this year, has been appointed vice-president of the Rutland Railway, Light & Power Company, and will have charge of the operation of the company with headquarters at Rutland, Vt. The Rutland Railway, Light & Power Company is controlled by W. S. Barstow & Company, New York, N. Y. Mr. Burt was manager of the Chattanooga Electric Company until its consolidation with the Chattanooga Railway & Light Company. When the Chattanooga & Tennessee River Power Company was organized to construct the hydroelectric plant at Hale's Bar on the Tennessee River he was made general manager of the company.

OBITUARY

Joshua Hale, for some years a partner of John Balch Blood in the engineering firm of Blood & Hale, Boston, Mass., was instantly killed by an automobile at Newburyport, Mass., on June 15. Mr. Hale was born in Boston in 1869 and was educated at the Massachusetts Institute of Technology and at Harvard University. At the time of his death he maintained an office in Boston, and was in close touch with engineering and financial interests.

A blackberry grower's organization at LaGrange, Ky., about 25 miles from Louisville, in Oldham County, will this year, for the first time ship its produce to Louisville, where R. H. Wyatt, general freight agent of the Louisville & Interurban Railway, has found purchasers among several preserving concerns. Heretofore the berry growers have shipped their entire product to the Eastern markets by steam roads. The crop this year will come to Louisville in the express cars of the Louisville & Interurban. This business has resulted in part from the efforts of Mr. Wyatt to show the potential shippers on the company's lines that often their best market is to be found close at home. In this instance the net returns figure out as well in spite of the fact that a lower price is paid, for the whole crop is contracted for, and, with the short haul, there is no need of iced-cars, and consequently the freight rate is lower. The berry traffic around Louisville, where the electric roads figure, will run to about 3,000 crates daily in the next week or so, all being hauled to Louisville.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Cumberland & Manchester Railroad, Manchester, Ky.**—Incorporated in Kentucky to build a railway from Manchester to Barbourville, 24 miles. Capital stock, $50,000. Incorporators: F. M. Heidrick, Brooksville, Pa.; R. E. Heidrick, Clarion, Pa.; W. D. Clark, Franklin, Tenn., and C. B. Lytle, Manchester, Ky.

***Nashville, Springfield & Northern Railroad, Nashville, Tenn.**—Incorporated in Tennessee to build an electric railway between Nashville, Springfield, Clarksville, Tenn., and Franklin, Ky., 80 miles. Capital stock, $10,000. Officers: E. G. Stribbling, Nashville, president; W. B. Myers, Goodlettsville, vice-president, and Robert C. Leonard, Nashville, secretary and treasurer.

FRANCHISES

Globe, Ariz.—The Globe & Miami Traction Company has received from the Council a six months' extension of time on its franchise to build a line between Globe and Miami. L. L. Lichtfield, president. [May 9, '14.]

Adams, Mass.—The Berkshire Street Railway has received from the Council in Adams a franchise to relocate its track on Columbia Street near the corner of Friend Street and Columbia Street.

Ayer, Mass.—The Lowell & Fitchburg Street Railway has received a franchise from the Council for the extension of its tracks on Main Street, Ayer, across the railroad tracks to connect with the Ayer terminus of the Shirley-Ayer line of the Fitchburg & Leominster Street Railway.

Haverhill, Mass.—The Bay State Street Railway has asked the Council for a franchise to alter and relocate some of its track in Haverhill.

Haverhill, Mass.—The Massachusetts Northeastern Street Railway has asked the Council for a franchise to relocate and change the grade on some of its track in Haverhill.

Pontiac, Mich.—The Detroit, Pontiac & Owosso Railway has asked the Council for a franchise to build a railway in Pontiac. This is part of a plan to construct a railway from Owosso to Detroit. George H. Lau, Detroit, is interested. [Aug. 1, '14.]

Kenmore, N. Y.—The International Railway has received a five-year franchise from the Council to extend its line on Military Road to the Velodrome, Kenmore.

Pittsburgh, Pa.—The Pittsburgh Railways has asked the Council for a franchise to construct additional track in Pittsburgh. The franchise asked is for a single track on Diamond Street from Grant Street to Wood Street, a double track from Try Street to Grant Street and for connections to be made with existing tracks on Forbes Street, Grant Street, Smithfield Street and Wood Street.

Portland, Ore.—O. M. Clark and associates have asked the Board of County Commissioners for a franchise to build a railway from Portland to Linnton. [May 15, '15.]

Portland, Ore.—The United Railways has asked the Board of County Commissioners for a franchise to build an extension from Portland to Oilton.

Belpre, W. Va.—The Marietta-Parkersburg Interurban Railway has asked the Council for a franchise to construct a railway in Belpre. This is part of a plan to construct a railway from Parkersburg to Marietta.

TRACK AND ROADWAY

Los Angeles & San Joaquin Valley Railroad, Los Angeles, Cal.—This company reports that on account of financial conditions no work has been undertaken on the project to build an electric railway between Los Angeles, Olig and Tejon Pass. Efforts will be made to revive the project when conditions improve. T. E. Gibbon, president. [Sept. 6, '13.]

Pacific Gas & Electric Company, Sacramento, Cal.—The following improvements in Sacramento are being planned by this company: Reconstructing P Street from Third Street to Tenth Street with single track, replacing 40-lb. T-rail; reconstructing J Street from Second Street to Twelfth Street with 87-lb. groove rail to replace 51-lb. rail; reconstructing 60-lb. T-rail with 87-lb. groove rail and building a new track on Second Avenue from Stockton Avenue to East Avenue, thence on Park Avenue to Thirty-fifth Street.

Bay Shore Railroad, San Diego, Cal.—Material for the construction of this company's lines from San Diego to Mission Beach has been received and work will be begun at once laying tracks on the bridge across the Mission Bay inlet. The railway will extend the length of Mission Boulevard and will cross the bridge over Mission Bay inlet, connecting with the Ocean Beach line for transportation to and from San Diego. [Aug. 1, '14.]

Municipal Railways of San Francisco, San Francisco, Cal.—Engineer O'Shaughnessy is preparing to let the contract for the building of the Church Street line from Market Street over the Church Street hill as far into the Noe Valley as the available funds will take it. The Board of Supervisors has authorized the building of the line, opposition having been withdrawn by the interested property owners.

Norwich, Colchester & Hartford Traction Company, Hartford, Conn.—The stockholders of this company have accepted the charter amendment which extends the rights of the company to complete its line between Norwich and Hartford for two years, and have practically planned to finish it within that time. The line is completed from Silver Lane to Glastonbury, 7 miles, and about 25 miles remain to be constructed. New York financiers have become interested in the proposition. At a recent meeting the following directors of the company were elected: Walter S. Garde, Hartford; Elmer Robinson and W. A. Strickland, Glastonbury; Stanley R. Ketcham, New York; Dr. C. E. Stark, Mayor T. C. Murphy, Frank Kromer and C. S. Holbrook, Norwich. [Jan. 19, '15.]

Jacksonville, Fla.—S. J. Pegram, Jacksonville, has offered to give $10,000 toward the construction of the proposed railway from Ortega to the Florida State camp ground at Black Point and a committee is canvassing among other realty owners to see what financial assistance they will be willing to render. Committees were appointed at a recent meeting of the military body of the Jacksonville Chamber of Commerce and it is expected that definite information will soon be ready with reference to the construction of the line. [May 8, '15.]

Jacksonville (Fla.) Traction Company.—The Council of Jacksonville has authorized this company to build an extension of its line along Kings Road, Jacksonville.

St. Petersburg & Gulf Railway, St. Petersburg, Fla.—Amended articles of incorporation have been prepared by this company to increase its capital stock from $400,000 to $1,000,000. An extension of its line from the Jungle to Pinellas Park and Clearwater is contemplated.

***Evansville, Ind.**—In connection with the proposed Dixie Bee Line Highway from Chicago to Nashville, to pass through Terre Haute, Evansville, Henderson, Ind., and on south to Tennessee, it has developed that there is a movement on foot to build an electric railway between Evansville and Terre Haute. The Terre Haute, Indianapolis & Eastern Railway reaches Sullivan and the Evansville Railway reaches Patoka, leaving a gap of 60 or 70 miles. Business men of Vincennes, Princeton and Terre Haute are interested in the proposition to build the line.

Iowa Railway & Light Company, Cedar Rapids, Ia.—Plans are being made by this company to extend its lines to Jefferson this summer. The company is now purchasing the right-of-way and material has been received for the construction of the line.

Ottumwa Railway & Light Company, Ottumwa, Ia.—This company reports that it is relaying about 1 mile of track in Ottumwa. All material for the construction has been purchased.

Iola (Kan.) Electric Railroad.—New rails are being laid by this company on its line on East Madison Avenue, Iola.

Bay State Street Railway, Boston, Mass.—The Public Service Commission of Massachusetts has authorized this company to operate its cars over a new location of tracks on Martin Street near Prospect Street, Essex.

Massachusetts Northeastern Street Railway, Haverhill, Mass.—This company has asked the Public Service Commission of Massachusetts for its approval of the relocation of its tracks on Hampshire Street at Arlington Street, Lawrence, established under an order from the Council Nov. 9, 1914.

Muskegon-Saginaw Electric Company, Muskegon, Mich.—Plans are being considered to extend this company's proposed line to St. Johns via Crystal, Carson City and Maple Rapids. The amount asked for the preliminary survey has been secured. [May 29, '15.]

Minneapolis & Northern Railway, Minneapolis, Minn.—This company, operating an 18-mile line between Minneapolis and Anoka, has contracted with the Minneapolis Street Railway whereby the lines of that company will be used for an entrance into Minneapolis.

St. Paul Southern Electric Railway, St. Paul, Minn.—Officers of this company recently voted to accept practially in full the terms offered by the St. Paul City Railway for the use of its tracks inside the city limits. A conference will be held within a few days to arrange further details and to sign the contract. Immediate steps will then be taken to make operating arrangements and it is expected that regular service from Hastings to St. Paul will be inaugurated within two weeks.

Metropolitan Street Railway, Kansas City, Mo.—This company has begun construction on its new track from the Pacific Bridge to the city limits on Electric Street, Jefferson. New and heavy rails have been laid.

***Mexico, Mo.**—Plans are being made by the Mexico Investment & Construction Company to build a railway from Mexico southwest, 14 miles, if a bonus of $30,000 can be obtained.

Trenton & Mercer County Traction Company, Trenton, N. J.—This company is rebuilding and repairing some of its lines in Trenton and the suburbs. The company has purchased 18,000 ties for this work and the overhead construction is being practically rebuilt in many cases.

Brooklyn Rapid Transit Company, Brooklyn, N. Y.—The Public Service Commission for the First District of New York has received bids for the supply of certain track materials to be used in equipping the New Utrecht Avenue elevated railroad and possibly on other lines of the dual system of rapid transit. The New Utrecht Avenue line is to be an elevated railroad connecting the Fourth Avenue subway through Thirty-eighth Street, New Utrecht Avenue, Eighty-sixth Street and Stillwell Avenue with Coney Island. It will be operated by the New York Consolidated Railroad Company (Brooklyn Rapid Transit) under the contract between the city of New York and the New York Municipal Railway Corporation. The bids covered open-hearth rails, manganese rails, splice bars, anti-creepers, cast-iron separators, cut track spikes, screw spikes and lag screws, ties and timber, bolts and nuts, nut locks, malleable-iron rail braces, washers and end inclines, tie plates, hand rails, frogs and switches. Contracts will be awarded this week.

***Olean, N. Y.**—O. P. Brown, Olean, and associates are considering plans to build an electric railway between Olean and Cuba, via the Haskell Road. Rights-of-way have been secured and a report has been presented to the Western New York & Pennsylvania Traction Company, which has signified approval of the route.

Cleveland (Ohio) Railway.—Peter Witt, street railway commissioner of Cleveland, stated on June 4 that the 123d Street crosstown line will be built just as soon as the city accepts the streets on which it will operate. They are new streets and are still owned by real estate operators.

Columbus Railway, Power & Light Company, Columbus, Ohio.—Work has been begun by this company on the extension of its Arlington Avenue line from Arlington Avenue and Fifth Avenue to Arlington Avenue and Cambridge Boulevard, Upper Arlington.

Lancaster Traction & Power Company, Lancaster, Ohio.—This company reports that plans are being made to build a 2-mile extension of its lines. All material for the construction has been received.

Toronto (Ont.) Railway.—Owing to the amount of track work ordered by the Ontario Railway Board and the financial stringency, this company has informed the city that it will not lay new track on McCaul Street from a point 400 ft. north of St. Patrick Street to College Street, Toronto. The city asked the concession in order that a proper roadbed might be put down as the southern portion of the street has already been done.

***Southern Counties Railway, St. Cesaire, Que.**—Construction has been begun and track is being laid on this company's proposed railway between St. Cesaire and Granby, 16 miles.

Chattanooga Railway & Light Company, Chattanooga, Tenn.—The construction on this company's new Chickamauga Park line is progressing rapidly. Grading has been completed to a point below Rossville and poles and wire are in place. Before the end of the summer the line will be extended to Fort Oglethorpe.

Nashville Railway & Light Company, Nashville, Tenn.—Work will soon be begun on the new $45,000 viaduct which is to span the Nashville, Chattanooga & St. Louis Railway tracks at Cedar Street, the city and the Nashville Railway & Light Company by agreement to divide the expense of construction. The street railway has two tracks over the present wooden bridge at this point.

***Beeville, Tex.**—Plans are being considered for the construction of a railway to connect Beeville, Cadiz, Oakville and Three Rivers, 25 miles. C. O. Williams, Corpus Christi, is interested.

Texas Traction Company, Dallas, Tex.—Construction on the extension of this company's line from Waco to Austin which was recently surveyed has been abandoned for the present. Officials of the company say that the construction will not be undertaken until conditions improve. While the line from Austin to San Antonio is assured, the time of its actual construction is still vague.

Tacoma Railway & Power Company, Tacoma, Wash.—Work will be begun at once by this company on the reconstruction of its tracks and foundations on Pacific Avenue between South Thirteenth Street and South Seventh Street, Tacoma.

Charleston, Parkersburg & Northern Railroad, Parkersburg, W. Va.—Financial backing from Eastern capitalists has been secured by this company and construction will be begun at once on the proposed line between Charleston and Parkersburg, 74 miles. The road will be standard gage, and self-propelled cars will be operated on it. K. B. Stephenson, Parkersburg, secretary. [Dec. 26, '14.]

Chicago & Wisconsin Valley Railroad, Madison, Wis.—Preliminary arrangements are being made to begin construction this summer on this company's line between Madison and Janesville. It is planned to start in Madison and Janesville simultaneously and work from each city. Arrangements have been made with eastern capitalists to furnish the necessary finances and equipment. J. E. Jones, president. [Sept. 26, '14.]

SHOPS AND BUILDINGS

Kankakee & Urbana Traction Company, Urbana, Ill.—The contract has been let for this company's new passenger and freight station at Rantoul. The building is to be modern in every way.

International Railway Company, Buffalo, N. Y.—This company plans to build a new station at Lockport to be a terminal for all interurban lines entering Lockport. The plans provide for a waiting room, ticket office, parcel room, dispatcher's office and news stand on the first floor, and for the superintendent's office, trainmen's rooms, lockers, etc., on the second floor.

POWER HOUSES AND SUBSTATIONS

Savannah (Ga.) Electric Company.—A report from this company states that it has purchased one 1000-kw, 650-volt railway motor generator, one 1250-kva, 13,000-volt transformer and two 200-kw, 2300-volt voltage regulators for use in its power station.

Toledo Railways & Light Company, Toledo, Ohio.—This company reports that its Detroit Avenue substation is about completed and machinery will be installed during July. A new 20,000-kw Westinghouse turbine and condenser will also be erected next month at the main plant.

Manufactures and Supplies

ROLLING STOCK

Lincoln (Neb.) Traction Company expects to purchase one snow-plow.

Salina (Kans.) Street Railway has purchased two single-truck cars which will be put into operation when the new union depot is completed about Sept. 1.

Sandwich, Windsor & Amherstburg Railway, Windsor, Ont., expects to purchase within the next two weeks two single-truck pay-as-you-enter cars.

TRADE NOTES

G. Drouvé Company, Bridgeport, Conn., supplied the sash operating device for the shops of the Norfolk & Western Railway, which were described in an illustrated article in the ELECTRIC RAILWAY JOURNAL of June 5.

Corliss Carbon Company, Bradford, Pa., manufacturer of motor and generator brushes exclusively, has opened its office at 1052 Peoples Gas Building, Chicago, Ill. The Western district is now in charge of Frank D. Frawley.

Ford, Bacon & Davis, New York, N. Y., engineers, are rebuilding a pier at Galveston, Tex. A new building is being erected on the pier, and arrangements are being made for the loading and unloading of material from steamships and for shipment by rail.

Union Switch & Signal Company, Swissvale, Pa, has just completed the installation of one block of the T. D. B. system of automatic signals controlled by continuous a. c. track circuits, on the line of the Michigan United Traction Company, between Grand Rapids and Kalamazoo.

Templeton, Kenly & Company, Ltd., Chicago, Ill., manufacturers of Simplex jacks, report that they have received orders for complete equipment of Simplex jacks from fully 50 per cent of the electric railway companies in Pennsylvania which have equipped their cars with emergency jacks in accordance with the State law effective June 1. Among these roads are the following: York Railways Company, Scranton & Binghamton Traction Company, Philadelphia Railways Company, Hershey Transit Company, Lehigh Valley Transit Company, North Branch Transit Company, Easton Transit Company, Wilmington & Philadelphia Traction Company, Buffalo & Lake Erie Traction Company, Frankford, Tacony & Holmesburg Street Railway and Schuylkill Railway Company.

S. K. F. Ball Bearing Company, New York, N. Y., has greatly increased its office space and now occupies a full wing on the sixth floor of the Hudson Terminal Building, 50 Church Street. This company says that it is the only company importing ball bearings from Europe that has not been interfered with by the war. Sweden, being a neutral country, is enabled to send large and regular shipments via Norway and Denmark without entering the war zone. These Swedish imported ball bearings are now very much in demand on account of the high grade of the material and superiority of workmanship. The bearings are made in Gothenburg in a model factory employing 3000 hands, engaged exclusively in the manufacture of S. K. F. ball bearings.

Graphite Lubricating Company, Bound Brook, N. J., announces that, due to expansion of the two departments of its business—the "Bound Brook" and "Nigrum" departments—it has purchased additional property which will be devoted exclusively to the manufacture of "Nigrum" graphite impregnated oil-less bearings. The manufacture of "Bound Brook" graphite and bronze oil-less bearings will be conducted as in the past in the original plant. The new plant is 2 miles from the original property and covers a plot of more than 500 ft. x 200 ft. It is situated on the tracks of the Central Railroad of New Jersey, Philadelphia & Reading Railroad and Baltimore & Ohio Railroad. A side track is available from each of these roads. This item corrects a note published in the ELECTRIC RAILWAY JOURNAL of June 12, in which it was stated that the company had transferred the manufacture of both products to the new plant.

Esterline Company, Indianapolis, Ind., has received the following orders from electric railways for "Golden Glow" headlights during the month of May: Mahoning Valley Railway, Los Angeles (Cal.) Railway, Charles City & Western Railway, Western Railways & Power Company, Atchison Railway, Light & Power Company, East St. Louis & Suburban Railway, Metropolitan Street Railway, Lawrence Railway & Light Company, Sioux City Service Company, Noord-Zuid-Hollandsche Tramweg Matschappij, Haarlem, Holland; Cleveland & Eastern Traction Company, United Railways of St. Louis, Salina Street Railway, Menominee & Marinette Street Railway, Granite City Railway, Long Island Railroad, Virginia Railway & Power Company, Wausau Street Railway, Titusville Traction Company, Chambersburg, Greencastle & Waynesboro Street Railway, Union Street Railway, Cedar Rapids & Marion City Railway, Harrisburg Railway, Chicago & Joliet Electric Railway, Hocking-Sunday Creek Traction Company, Lincoln Traction Company, Chambersburg & Shippensburg Railway, Iowa Railway & Light Company, Bristol & Plainville Tramway, St. Joseph Railway, Light & Power Company, Peoples Gas & Electric Company, Union Electric Company, Regina Municipal Railway.

ADVERTISING LITERATURE

Walter A. Zelnicker Supply Company, St. Louis, Mo., has issued folder No. 171 listing its stock of dump and flat cars.

Chicago Pneumatic Tool Company, Chicago, Ill., has issued Bulletin No. 34-X describing and illustrating its A-G "Giant" gas and gasoline engines.

Roller-Smith Company, New York, N. Y., has issued a number of bulletin sheets which illustrate and contain price lists of its various types of switchboard apparatus and portable instruments, including circuit breakers, reverse-current relays, frequency meters, volt-ammeters for d.c. and a.c. railway signal operation and watt-hour meters.

John C. Dolph Company, Newark, N. J., has issued a folder on its lacquer, an alcohol black finishing varnish for protecting armatures, field coils, dynamos or motors from the action of lubricating oils or moisture. Among the users of this varnish are the Hudson & Manhattan Railroad, Long Island Railroad, New York, New Haven & Hartford Railroad, Pittsburgh Railways and Texas Traction Company.

Barnes & Kobert Manufacturing Company, Milldale, Conn., has issued a catalog describing its trussed steel pole line bracket hardware. In the manufacture of this equipment the locust or oak bracket cobs are thoroughly kiln dried and impregnated with kerosene under pressure. Cold drawn steel shells are forced on and the cobs screwed on to the brackets. The shells are then swedged into position. A locking feature prevents thimbles from backing off or becoming loose owing to shrinkage. No metal portion of the brackets touches the insulator.

Electrical Testing Laboratories, Inc., New York, N. Y., has issued a bulletin which contains a general description, accompanied with illustrations, of the equipment, organization and work of its testing service. The electrical testing laboratories of this organization offers to manufacturers and operating companies a testing service which is complementary to that furnished by their own laboratories. Its comprehensive equipment includes some instruments and apparatus which often even the best equipped private laboratories do not possess. The company commands an experienced staff and an extensive organization which keeps in close touch with the electrical engineering field. The work of the laboratories is confined to testing and inspecting. It undertakes practically every work within its field of activity, which involves the ascertaining of facts and performance. Its testing service consists of tests and investigations at the laboratories upon apparatus and materials submitted by clients, acceptance tests at the factories or at the laboratories upon apparatus and materials to determine compliance with clients' specifications, and operating or service tests made after installation. In addition to the above the company offers facilities with which clients may conduct their own tests and investigations. Well equipped rooms are available if privacy is required.

Bulletin No. 5

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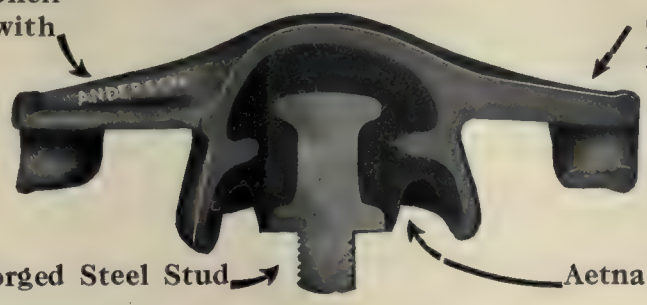

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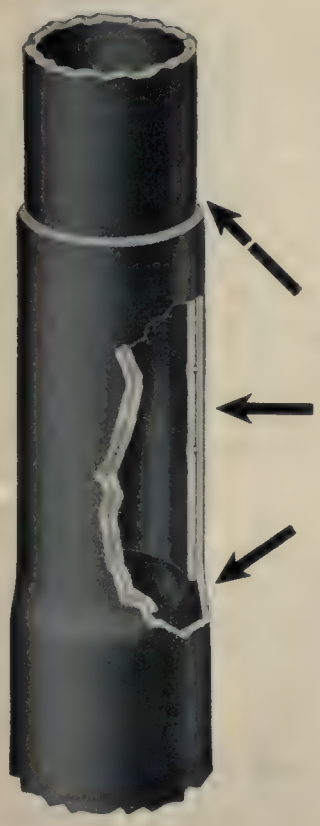

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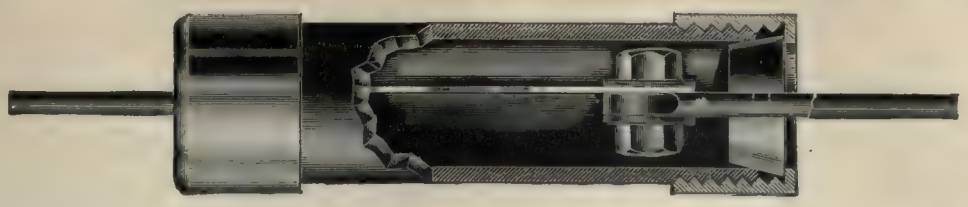

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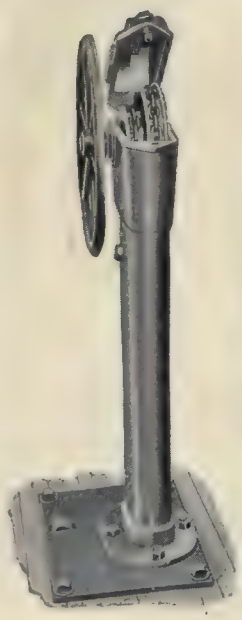

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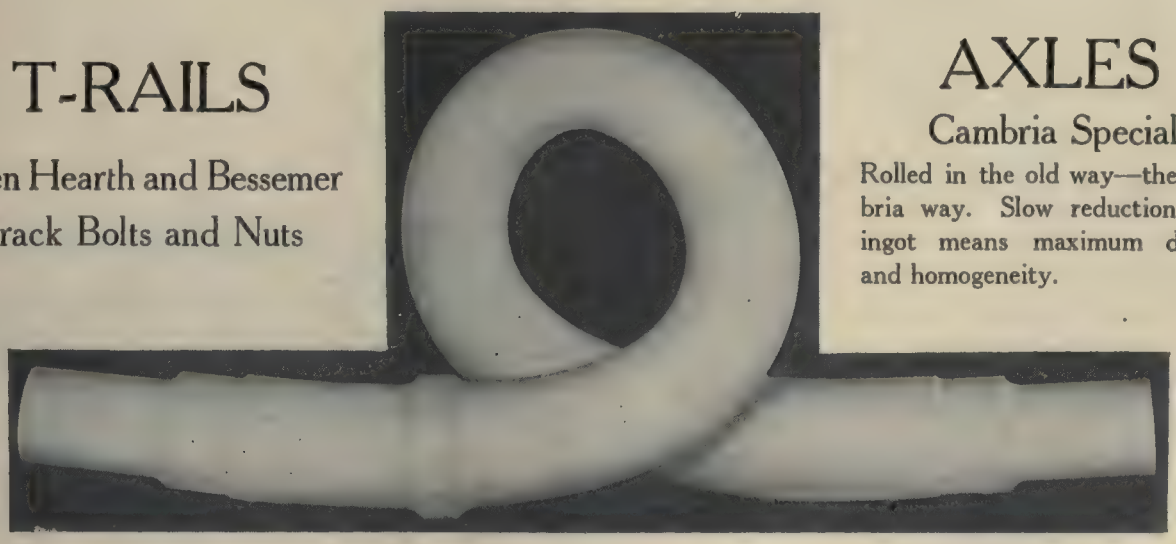

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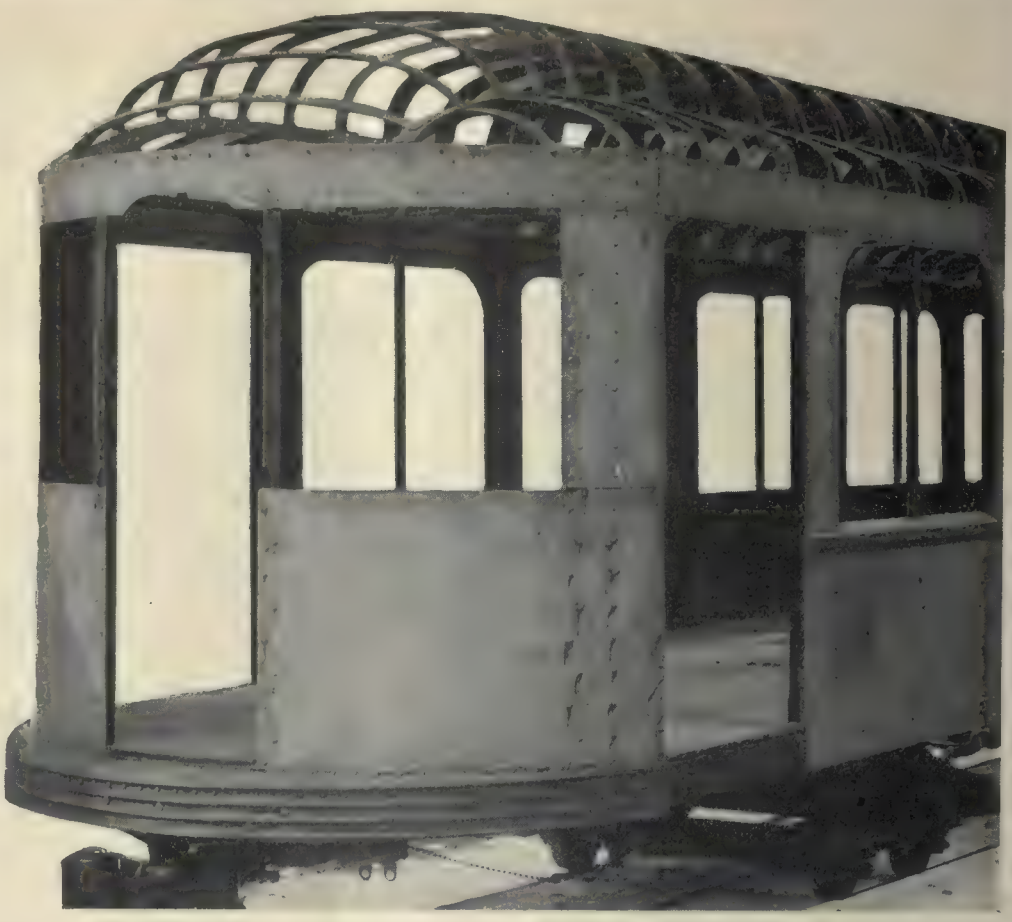

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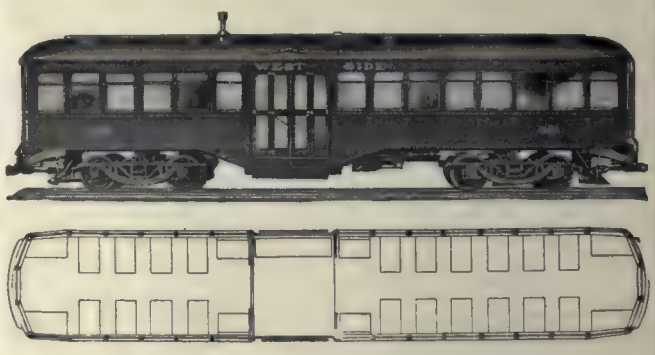

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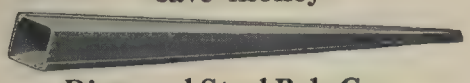

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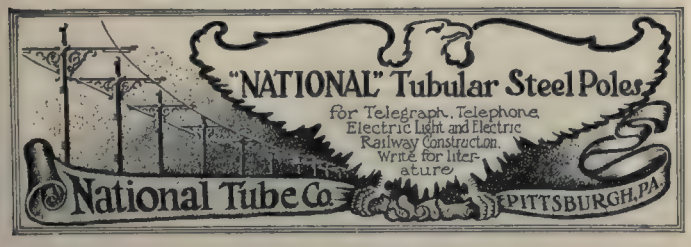

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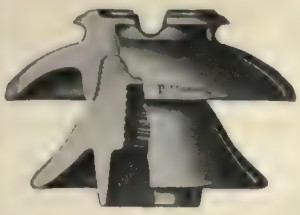

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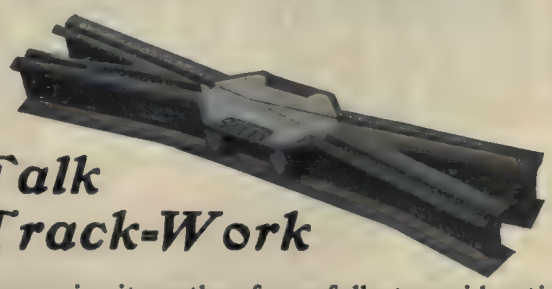

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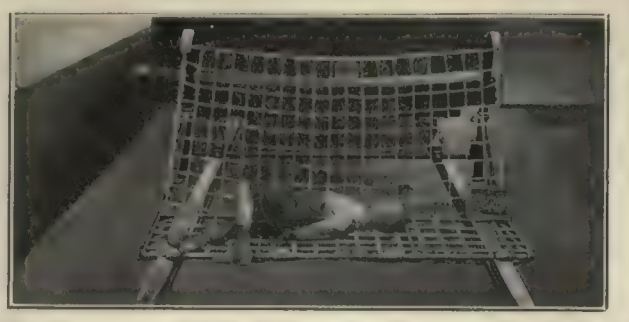

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For Cash Fares

—increases fare receipts 2 to 15 per cent.
—is the fare box you can rely on for certainty, accuracy and economy.

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For Cash Fares and Tickets

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The National Standard for Car Curtains and Car Upholstery

AGASOTE HEADLINING

The only headlining made in one solid piece. Will not separate, warp or blister. Waterproof and homogeneous.

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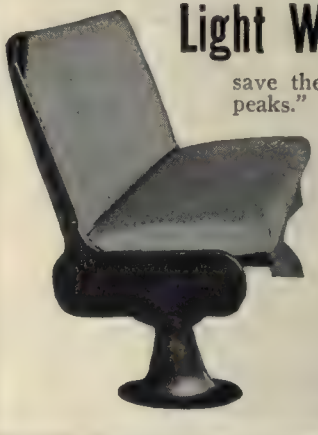

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save the drain on current at "traffic peaks."

WALKOVER
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give more room—more comfort—more money value than any other seat. *Specify them for your new cars.*

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MAKE THE BEST

THE RAILWAY SUPPLY & CURTAIN CO.

CHICAGO

CAR CURTAINS & FIXTURES FOR ALL PURPOSES

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INTERNATIONAL SPECIALTIES TALK FOR THEMSELVES

Registers and Register Fittings, Badges, Punches and Bell Cord.

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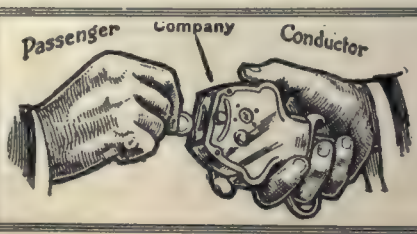
15 SOUTH THROOP ST., CHICAGO

IN A WORD
THE RAPID READY CHANGE CARRIER

25 - 10 - 5 - 1 or 5

enables conductors to give change quickly. Passengers can pass into car immediately—Prevents crowded platforms—Shortens time at car stops. Just what you need. Price, $1.75.

CHAS. F. ETTER
904 N. 2nd St., Harrisburg, Pa.



Direct Automatic Registration By the Passenger

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The Universal Trolley Wheel

has made good in service during the last four years. It is a self-lubricating renewable center wheel of accurate workmanship, great strength and durability.

The Universal Trolley Wheel Co.
NORTHAMPTON, MASS.
Sales Agents: Automatic Ventilator Co.
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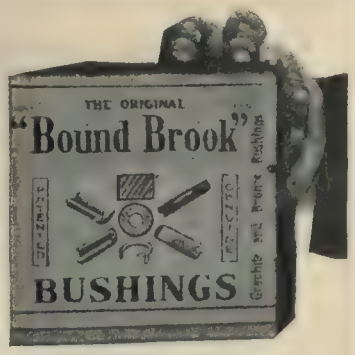
The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

In Many Car Houses



they are considered as vital to proper car operation as correct fusing or good motor ventilation. Electric railway heads have come to look upon them as important factors in keeping down operating costs.

They cannot be bettered. Perfect lubrication combines with high grade bronze to produce a hard-surface bushing.

Modern operating practice demands their use. Specify them in your next order.

All genuine graphited "Oil-less Bearings" have always been made at Bound Brook, N. J., in the United States of America, by the

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Railway Headlights
Used by 183 Railroads

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For Speed and Durability

B-V Visible Punches

The visible feature and tool steel dies of the finely finished B-V Punches make them Leaders. Their durability and speed of operation cannot be duplicated.

Write for catalog.

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Car Roof Preservation
comes with
Bayonne Car Roofing

The waterproof, sun-proof, storm-proof, age-proof specially prepared canvas roofing.

John Boyle & Co., Inc., 112 Duane St., New York
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MASON SAFETY TREADS—prevent slipping and thus obviate damage suits.
KARBOLITH CAR FLOORING—for steel cars is sanitary, fireproof and light in weight.
STANWOOD STEPS—are non-slipping and self-cleaning.
Above products are used on all leading Railroads. For details address

AMERICAN MASON SAFETY TREAD CO.
Main Offices: Lowell, Mass. Branch Offices: Boston, New York City, Chicago, Philadelphia, Kansas City, Cleveland, St. Louis.

The Peter Smith Heater Company's Forced Ventilation Hot Air Heaters are approved by the Board of Underwriters', also they are protected with patents in United States and Canada. Catalogue and detail data will be furnished you upon request.

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1735 Mt. Elliott Ave., Detroit, Mich.

The Best Shade Rollers For Cars

SPECIAL shade rollers for cars, that will last and give satisfaction for years, and yet cost but little more than the poorest you can buy, are made by the Stewart Hartshorn Co., E. Newark, N. J. This Company is by far the largest shade roller manufacturer in the world. It is able to give high quality at lower prices because of the enormous output. Write for catalog, stating wants. You are always protected, when you buy shade rollers, if they bear the signature,

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Ventilation—Sanitation—Economy—Safety

All Combined in

THE COOPER FORCED VENTILATION HOT AIR HEATER

Patented September 30, 1913. *Ask for the full story.*

We Also Manufacture Pressed Steel Hot Water Heaters

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A Road May be Proud of Its Braking Efficiency

Yet it may be wrong to conclude that the type they used should be on *your* cars. Your operating conditions are probably different. What is profitable for one line may be unsuited to many others. The easiest way to make *sure* of getting maximum braking economy and efficiency for *your* road is to consult specialists. That is our business. Consult us.

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Over New Fuses

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"The Dependable Fuse"

Ask for "26-R"

Built in 600 Volt and 250 Volt capacities, N. E. Code Standard, especially for electric railway service.

Carefully assembled. Built of high grade materials. Positive in action.

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Mailed on Request

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1016 Congress St., Chicago

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Buckeye Emergency Jack No. 239

An extra powerful and handy Jack for extra difficult jobs.

Forged Parts are Special Heat Treated

This Jack can be worked from many angles to load, yet full lifting power is available from any position. Write for catalog, details and price.

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TRACKOLINE

KILLS EVERY WEED TOP ROOT & SEED

GUARANTEED CATTLE PROOF

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FOR BOILER FEED AND ALL INDUSTRIAL USES

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Missouri Trust Bldg., St. Louis, Mo.

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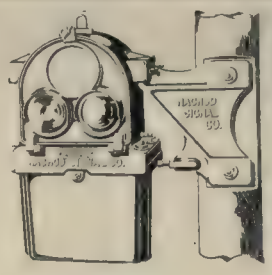

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Highway Crossing Bells.
Headway Recorders—Trolley Contactors.

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Selling Agents for Dunham Hopper Door Device—Feasible Drop Brake Staff—Columbia Lock Nut—Kling Bolts—Shop Cleaner—"Texoderm". *Sole Eastern Agents for* St. Louis Surfacer & Paint Co. *General Eastern Agents for* Hutchins Car Roofing Co.—Multiple Unit Puttyless Skylight—Car and Locomotive Jacks—Electric Arc Welders. *Special Agents for* The Tool Steel Gear & Pinion Co. *Special Agents for* C & C Electric & Mfg. Co. *General Agents for* Anglo-American Varnish Co. *New England and Southern Agents for* Thayer & Co.—Chillingworth Seamless Gear Cases. *General Eastern Agents* for the Union Fibre Co.

The Men Who Plan and Execute

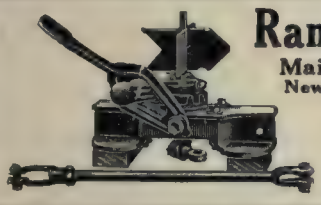
owe some of their efficiency to the thought, energy and resourcefulness of manufacturers who supply the means for such achievements.

These men know how important it is for them to keep in touch with the manufacturers.

In the electric railway industry, such men find the easy, certain and thorough way to keep in touch with manufacturers is through the advertising pages of the

Electric Railway Journal

239 West 39th Street New York



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Automatic Switch Stands, T-Rail Special Work, Manganese Construction, Crossings, Switches, Etc.

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Manufacturers / Engineers / Contractors } for { Automatic Signalling / Interlocking } either { A.C. or D.C.

No Interlocking Switches Are Safe Without Federal Switch Guards

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T Rails and Nelsonville Filler and Stretcher Brick

offer all the advantages without the disadvantages of the groove rail. Construction approved by city engineers. Write for Booklet.

THE NELSONVILLE BRICK CO. Nelsonville, Ohio

Highway Crossing Signals

Visible and Audible Type Day and Night
Trolley and Rail Contacts
Car Counting Signals

Ohio Signal Co. Canton, O.

THEW SHOVELS

The Thew Electric Railway Shovel was designed after a thorough investigation of the work to be done. It is especially adapted to the peculiar requirements of Electric Railway Companies.
Write for catalog "F" and list of Electric Railway Companies using Thews.

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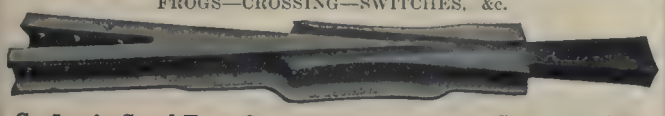
Chapman Automatic Signals

Charles N. Wood Co., Boston

MANGANESE STEEL TRACK WORK

FROGS—CROSSING—SWITCHES, &c.



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Owned and operated by Curtis & Co. Mfg. Co., St. Louis. 2

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Tongue Switches, Mates, Frogs, Curves and Special Work of all kinds for Street Railways.

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2—28′ 10″ Paywithin Cars, 4 G.E. 80 motors, Brill 27 G Trucks, AA1 Air Brakes.
1—Double Truck Sprinkling Car, 4,000 gallons capacity.
30—Brill 20′ Closed Cars, G.E. 1000 M., Brill 21-E Tr.
20—Jones 20′ Closed Cars, G.E. 52 Motors, Bemis Trucks.
2—Jackson and Sharp 18′ Car Bodies.
10—42′ Kuhlman Int. Cars, Bald. Tr., 4 Wgh. 121 Motors.
20—Comb. Int. Cars, Bald. Trucks, 4 Wgh. 119 Motors.
8—Brill 22′ Closed Cars, Wgh. 68 Motors, Peck. Trucks.
1—Jackson and Sharp 18′ Car Body.
4—Brill 30′ Express Cars, Brill 22-E Trucks.
9—Brill 30′ Express Cars, complete, 4 G.E. 1000 Motors, AA1 Air Brakes, Brill 27-G Trucks.
10—Wason 10 B. Open Cars, G.E. 1000 Motors, Bemis Tr.
5—Brill 10 B. Open Cars, West 12A M., Brill 21-E Trucks.
8—Brill 14 B. Open Cars, Wgh. 56 Motors, Brill 22-E Tr.
8—West. 101B-2 Railway Motors, complete.
40—G.E. 90 Railway Motors, complete.
20—G.E. 66 Railway Motors, complete.
103—G.E. 88-B brand new Motors, complete.
12—G.E. 73 Railway Motors, complete.
24—G.E. 87 Railway Motors, complete.
20—G.E. 57 Railway Motors, complete.
20—G.E. 80 Railway Motors, complete.
12—G.E. 54 Railway Motors, complete.
60—G.E. 1000 Railway Motors, complete.
60—G.E. 800 Railway Motors, complete.
30—West. 12A Railway Motors, complete.
32—West. 49 Railway Motors, complete.
8—West. 38B Railway Motors, complete.
10—West. 112 Railway Motors, complete.
4—West. 68-C Railway Motors, complete.
4—West. 68 Railway Motors, complete.
22—G.E. 80 Armatures, brand new.
2—G.E. 87 Armatures, brand new.
2—G.E. 73-C Armatures, brand new.
4—G.E. 67 Armatures, brand new.
18—G.E. 57 Armatures (second-hand), two turn.
30—G.E. 57 Form A Motor Casings.
3—West. 101-B2 Armatures, brand new.
3—West. 93A-2 Armatures, brand new.
3—West. 93A Armatures, brand new.
22—K6 Controllers. 62—K10 Controllers.
44—K11 Controllers. 30—K14 Controllers.
28—K2 Controllers. 28—B29 Controllers.
2—Sets Brill 27G Trucks, 4′ 6″ wheelbase.
6—Brill 21E Trucks, 7′ 6″ and 8′ wheelbase.
10—Dupont Trucks, 7′ 6″ wheelbase.

All of the above apparatus is in first class condition for immediate service. For further particulars apply to

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WANTED

Immediate delivery

Frequency Changer Set

Capacity 500 k.w. to 1000 k.w. 25 cycle, three phase motor, 13,200 volts, 60 cycle, three phase generator, 13,200 volts. Speed 300 R.P.M.

W. S. Barstow & Co., Inc.
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MACGOVERN AND COMPANY
INC.

FRANK MACGOVERN, Pres. & Gen Mgr.

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'Phone, 3375-3376 Rector

60 CYCLE ROTARY CONVERTERS

1—300 KW. Westinghouse, 3 phase, 600 volts, D.C., 600 RPM., 500 amps., 370 volts AC., with starting motor.
1—100 KW. Gen. Elec., type TC, form A, 550 volts, 182 amps. DC., 340 volts AC., 1200 RPM.

25 CYCLE ROTARY CONVERTER

1—300 KW. Allis-Chalmers, 3 phase, 6 pole, 650 volts, 462 amps., 500 RPM.

Immediate Delivery

THIS IS OF NECESSITY ONLY A PARTIAL LIST—
SEND FOR CATALOG

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL

Write for Price and Full Particulars to

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

COMPLETE ARMATURES FOR SALE

FOR ALL THE STANDARD
STREET RAILWAY MOTORS

GET OUR PRICE WE CAN SAVE YOU MONEY

America's Greatest Repair Works

CLEVELAND ARMATURE WORKS, Cleveland, O.

The results of the best practice in electric railway work are recorded every week in the Electric Railway Journal

SEARCHLIGHT SECTION

60 Cycle, Rotary Converters

2—General Electric 1000 K.W., 600 v., 360 R.P.M., type "HC," comp. wound, 6 phase. Complete with air cooled 2300 v. trans., reactances and panels.
2—General Electric 500 K.W., 575 volt, 600 R.P.M., type "H.C," comp. wound, 6 phase. Complete with air cooled trans., 2300 v. reactances and panels.
1—300 K.W. Westinghouse, 600 volt D.C., 370 volt A.C., 600 R.P.M. with oil cooled G.E. trans. 11,000 v. primary.
1—200 K.W. Westinghouse, 600 volt D.C., 370 volt A.C., 720 R.P.M.
Also following transformers:
3—125 K.W. G.E. 2400 volts prim., 370 volts sec.
6—75 K.W. Ft. Wayne, 10,000-9000-185-370 v.
3—175 K.W. Stanley, 10,000-2300 volts.

25 Cycle, Rotary Converters

1—500 K.W. General Electric, 3 phase, 25 cycle, 600 volt D.C., 370 volt A.C., 375 R.P.M.
2—300 K.W. Genl. Elect., 3 ph., 25 cycle, 750 R.P.M., 600 volts.
1—250 K.W. Genl. Elect., 3 ph., 25 cycle, 500 R.P.M., 600 volts.
Can also furnish transformers—all voltages.

Railway Car Equipment

8—75 H.P. Westinghouse, 112 Railway Motors, 600 volts, newly rewound armatures, full commutators, rebuilt entirely. Will be sold fully guaranteed, upon any reasonable terms of payment.
12—G.E. 57 Motors, 50 H.P. Each.
16—G.E. 67 Motors, 40 H.P. Each.
20—G.E. 201 Motors, 65 H.P. Each.

Booster Set

Generator—West'gh'se 70 K.W., 350 volt, 200 amp. series wound.
Motor—West'gh'se 105 H.P., 575 volt. 950 R.P.M., type "SA" shunt wound.
Complete with coupling and panel.

ARCHER & BALDWIN, 114 Liberty Street ROOM 302 'Phone Rector 4337-4338 **New York**

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ENGINES—BOILERS—MOTORS—CONDENSERS—ETC.

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ACCOUNTANT and auditor desires permanent position where ability and attention to business will count. Age 35. Experienced and familiar with modern methods. Inquiry will be treated confidential. Address Box 754, Elec. Ry. Jour.

GENERAL auditor, 34, desires change. Wide and varied experience with both municipal and private concerns operating steam and electric railways (city and interurban), light and power and gas properties. Competent to take full charge of office or carry out practical, efficient, and economical auditing and accounting systems according to operating conditions. Correspondence solicited. Address Box 764, Elec. Ry. Jour.

MASTER mechanic open for position. Twenty years' experience maintaining rolling equipment, interurban and local. Can handle men to advantage. A1 references. Am American, married. Address Box 758, Elec. Ry. Jour.

POSITION wanted as assistant auditor or chief clerk. Thorough knowledge of electric railway accounting. Five years' experience in auditing work. Address "C. A. G.," 1316½ Commerce St., Dallas, Texas.

FOR SALE

New Trolley Wire Bargain

Eighteen One-Mile Reels

No. 0000 Hard Drawn Grooved Copper Trolley Wire

On Original Reels

Bought by Mistake
Low Price to Move Quick

Wire or Telephone Us

ZELNICKER
WALTER A. ZELNICKER SUPPLY COMPANY
St. Louis

RAILS, EQUIPMENT, ETC.

MISCELLANEOUS

WANTED

Generator Set and Surface Condenser

Second-hand 300 K.W. Turbo Generator Set, with exciter; 2300 volt, 60 cycle, 3 phase, 150 lb. steam pressure condensing. Also surface condenser with air and circulating pumps for fresh injection water.

All must be in good running order. State where may be inspected and quote price, with full particulars.

Box 768 Electric Railway Journal

Marketing Scrap

In an issue of this paper an official of a large light and railway company said:

> *"Some means of interchanging information about materials on hand would be desirable. One company might use a certain type of car or line equipment and have on hand a large supply of extra parts, which while perfectly good, would become useless, and if it were possible to interchange information with another company using the parts in question, many dollars which are now lost would be saved. Nearly everyone familiar with storeroom accounting can recall thousands of dollars which might have been saved if proper means had been adopted."*

THE Searchlight Section of the ELECTRIC RAILWAY JOURNAL offers a market place for just such an interchange of information as mentioned above. Machinery or supplies that have outlived their usefulness, or are no longer standard with one company are often just what another company requires, and if advertised in the Searchlight Section of the JOURNAL the exchange could be made at very slight cost.

Better look over your stock and send us a list of what you have on hand but for which you have no immediate use. The Searchlight Section can help you whether you are looking for a market, a man or a job.

Get your wants into the Searchlight

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Over 300 different products are here listed.

The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

Accountants.
Greims Corporation, H. E.

Acetylene Regulators.
Imperial Brass Mfg. Co.

Acetylene Service.
Prest-O-Lite Co., Inc., The.
Searchlight Co., The.

Advertising, Street Car.
Collier, Inc., Barron G.

Air Cleaners.
Lord Mfg. Co.

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Anchors, Guy.
Johns-Manville Co., H. W.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Automobiles and Busses.
Brill Co., The J. G.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles.
Brill Co., The J. G.
Cambria Steel Co.
Cincinnati Car Co.
National Tube Co.
Niles Car & Mfg. Co.
Standard Steel Works Co.
U. S. Metal & Mfg. Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
American General Eng'g Co.
Columbia M. W. & M. I. Co.

Badges and Buttons.
International Register Co., The
Western Electric Co.

Bankers and Brokers.
Halsey & Co., N. W.

Batteries, Dry.
Johns-Manville Co., H. W.
Western Electric Co.

Batteries, Storage.
Electric Storage Battery Co.
Esterline Co.
Western Electric Co.

Bearings, Center.
Baldwin Locomotive Works.

Bearings and Bearing Metals.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G
More-Jones Brass & Metal Co.

Bearings, Oilless, Graphite, Bronze and Wood.
Graphite Lubricating Co.

Bearings, Roller and Ball.
Railway Roller Bearing Co.

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Brill Co., The J. G.
Electric Service Supplies Co.
Ohio Signal Co.
Reiter, G. C.
Western Electric Co.

Benders, Rail.
Niles-Bement-Pond Co.

Blow Torches for Soldering and Brazing.
Prest-O-Lite Co., Inc., The.

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co.
Johns-Manville Co., H. W.

Boiler Coverings.
Johns-Manville Co., H. W.

Boiler Graphite.
Dixon Crucible Co., Jos.

Boiler Tubes.
National Tube Co.

Boilers.
Babcock & Wilcox Co.

Bond Clips.
Electric Railway Improv. Co.

Bond Testers.
American Steel & Wire Co.

Bonding Apparatus.
Prest-O-Lite Co., Inc., The.

Bonding Tools.
American Steel & Wire Co.
Electric Railway Improv. Co.
Electric Service Supplies Co.
Ohio Brass Co.
Prest-O-Lite Co., Inc., The.

Bonds, Rail.
American Steel & Wire Co.
Electric Railway Improv. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Roebling's Sons Co., John A.
Western Electric Co.

Book Publishers.
McGraw-Hill Book Co., Inc.

Boring, Tools, Car Wheel.
Niles-Bement-Pond Co.

Braces, Rail.
Kilby Frog & Switch Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Piling and Lumber.)
Electric Ry. Equipment Co.
Electric Service Supplies Co.
Lindsley Bros. Co.
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Sauvage-Ward Brake Co.

Brake Shoes.
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Barbour-Stockwell Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.

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Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
Lord Mfg. Co.
National Brake Co.
U. S. Metal & Mfg. Co.
Westinghouse Traction Brake Co.

Brazing. (See Welding.)

Brooms, Track, Steel or Rattan.
Western Electric Co.

Brushes, Carbon.
Calebaugh Self-Lubricating Carbon Co.
Dixon Crucible Co., Jos.
General Electric Co.
Jeandron, W. J.
LeCarbone Co.
Morgan Crucible Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Bumpers, Car Seat.
Electric Service Supplies Co.
Imperial Rubber Co.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.

Bunting.
Boyle & Co., Inc., John.

Bushings, Fibre.
Diamond State Fibre Co.

Bushings, Graphite and Wooden.
Graphite Lubricating Co.

Bushings, Rubber.
Imperial Rubber Co.

Buttons. (See Badges and Buttons.)

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc., see those Headings.)

Car Trimmings. (For Curtains, Doors, Seats, etc., see those Headings.)

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
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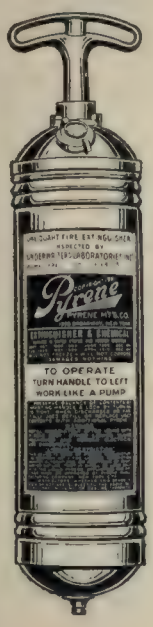

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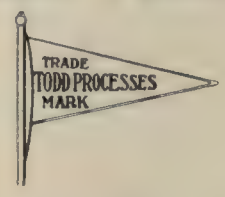

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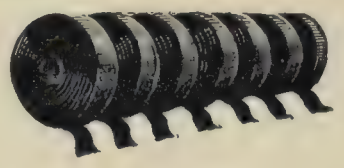

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General Electric Co.

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Johns-Manville Co., H. W.
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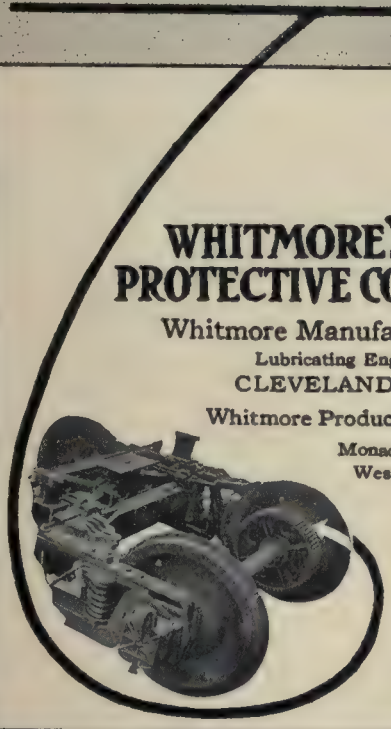

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Heat Treated Motor Gearing

Facilities unlimited.
Modern Gas Furnaces
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On July 9, 1914, a car weighing 26 tons was packed with TULC No. 2 JP—IN JOURNALS. New brasses were put in and car went into service that day. Up to March 20, 1915, this car had run 26,019 miles without any change being made in original packing, and the brasses of the axles were found in perfect condition, the original finish not even worn off.

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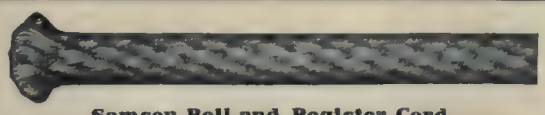

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The "Hycap=Exide" Battery
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THE ELECTRIC STORAGE BATTERY CO.
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Pantasote Co.

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Hartshorn Co., Stewart.

Shades, Vestibule.
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Long Co., E. G.
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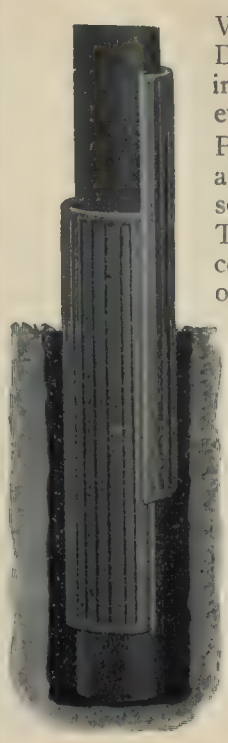

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Drew Electric & Manufacturing Co.
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186

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Printing begins on Tuesday of each week.
Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.
New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.
If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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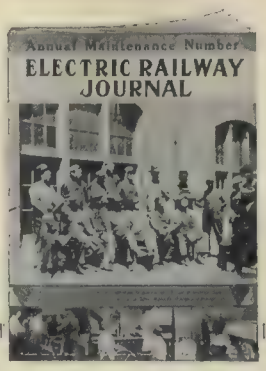
Your *Own*



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.....1915

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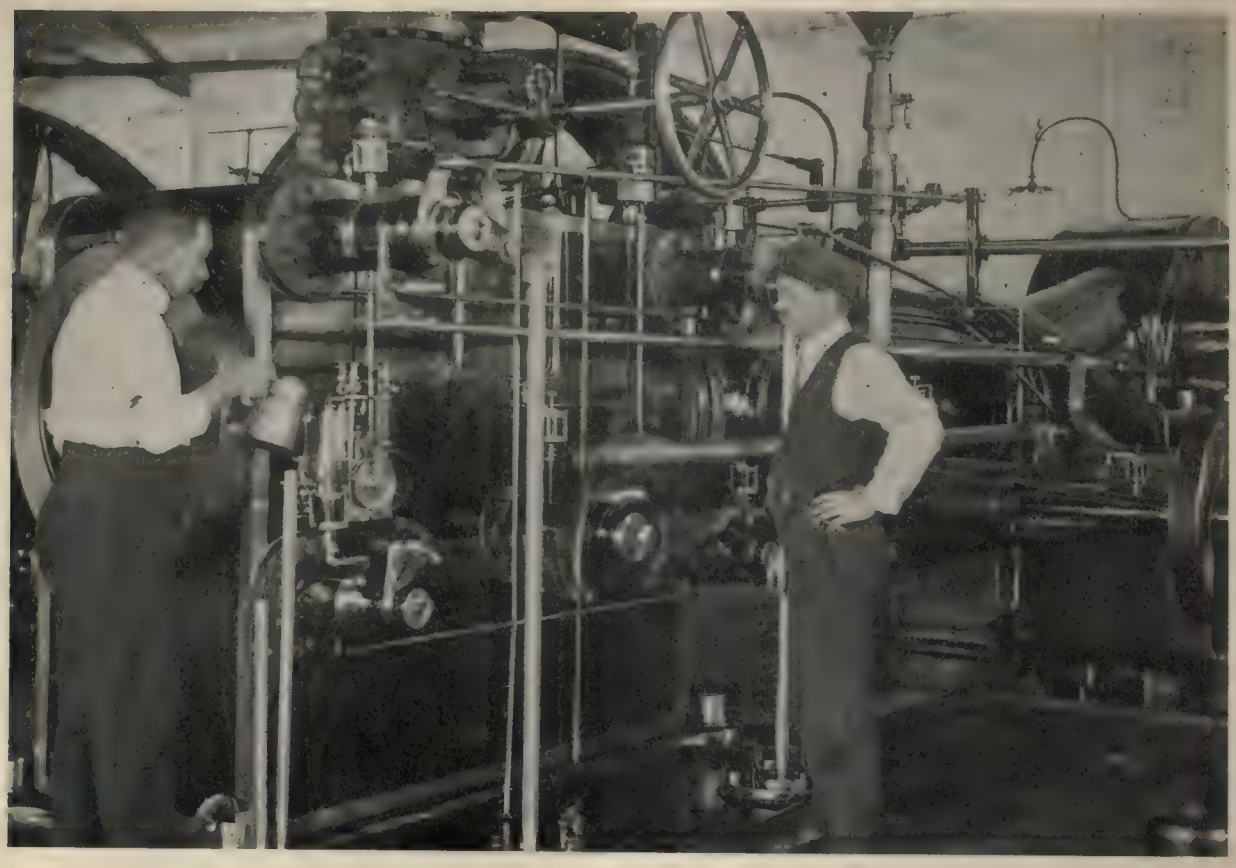

The Heart of the Prime Mover

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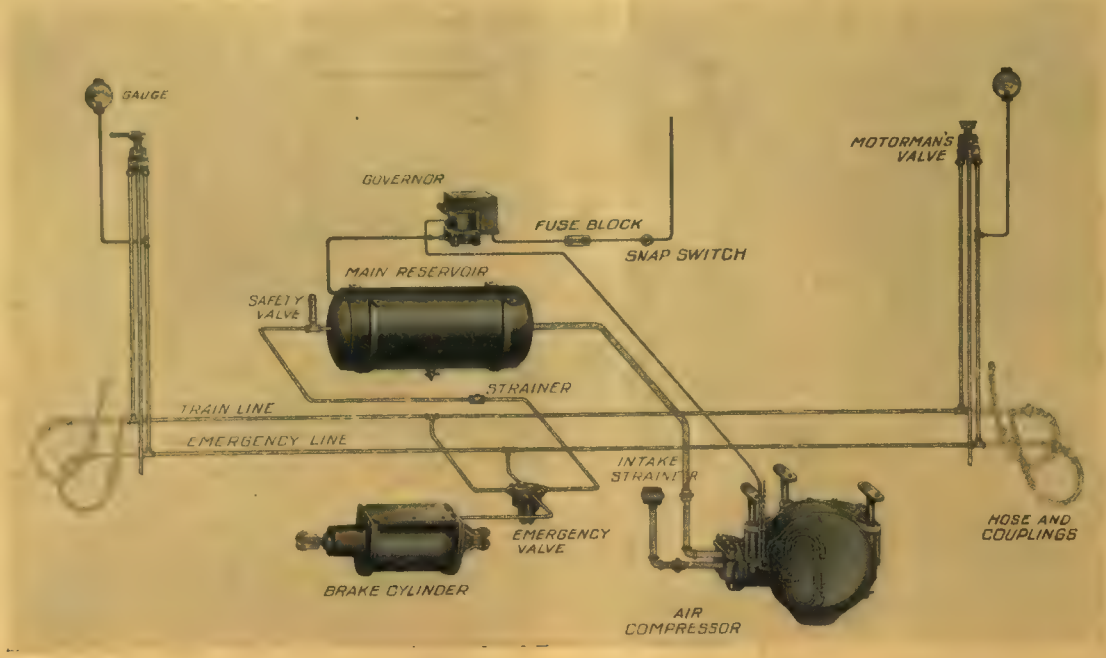

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Increases safety factor of the straight air brake on city cars, and also provides a means for safe operation of two-car trains during rush hours and other periods of heavy travel.

A quicker application of the brake can be made when the motorman's valve handle is placed in the emergency position, for the reason that the emergency valve operates and admits main reservoir air direct to the brake cylinder without passing through the motorman's valve.

If desired, a conductor's valve will be furnished so that an emergency application of the brakes can be made by the conductor from his position on the rear platform, or from any part of the car or train.

An automatic application of the brakes is made should a rupture occur in any part of the emergency line. This insures maximum braking power if the pipe connections at the ends of the car are accidentally broken.

An automatic application of the brakes is made in the event of the cars pulling apart when operating in trains.

Investigate G-E Air Brake Equipment at the Convention.

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For Michigan business refer to General Electric Company of Michigan, Detroit, Mich.
For Texas, Oklahoma and Arizona business refer to Southwest General Electric Company (formerly Hobson Electric Co.), Dallas, El Paso Houston and Oklahoma City. For Canadian business refer to Canadian General Electric Company, Ltd., Toronto, Ont. 5182

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Electric Railway Journal

New York, June 26, 1915

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Coasting Records of Northern Texas Traction Company 1198

This company operates coasting recorders on thirty interurban and 153 city cars. The average coasting on the interurban lines is now 38.2 per cent and 34.2 per cent on the city lines. The cost of energy has been decreased with the increase in coasting.

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C. E. R. A. Meeting 1201

Details of the non-technical features of the boat trip and an abstract of W. L. Allen's paper on railway motor gearing are given.

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John S. Mills, assistant superintendent San Francisco-Oakland Terminal Railways, points out the practical aspects of the question and urges careful preparation for settlement.

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JAMES H. MCGRAW, President. A. E. CLIFFORD, Secretary. J. T. DE MOTT, Treasurer. H. W. BLAKE, Editor.

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FRICTION

(Its relation to efficient brake control of moving trains)

FRICTION IS A RETARDING FORCE IN SOCIETY, POLITICS, BUSINESS AND RELIGION.

BUT FRICTION REPRESENTS A CURIOUS PARADOX IN THE VARIOUS FIELDS OF ENGINEERING AND MECHANICS. IT IS AT ONCE ESSENTIAL TO EFFICIENCY AND OPPOSED TO IT. PRACTICALLY ALL APPLICATIONS OF POWER DEPEND FINALLY UPON FRICTION; ALSO ALL POWER APPLICATIONS ARE SUBJECT TO SERIOUS LOSSES DUE TO FRICTION.

A RAILROAD TRAIN IS PECULIAR IN THAT WHILE ACCELERATION—THE HAULING CAPACITY OR TRACTIVE EFFORT OF THE LOCOMOTIVE—DEPENDS FUNDAMENTALLY UPON FRICTION—(WHEEL—RAIL); DECELERATION—BRAKE CONTROL OF ALL TRAIN MOVEMENT—ALSO DEPENDS FUNDAMENTALLY UPON FRICTION (WHEEL—SHOE).

ON THE ONE HAND WE HAVE HEAVY TRAINS AT HIGH SPEEDS REPRESENTING UNBELIEVABLE TOTALS OF FOOT TONS OF ENERGY; ON THE OTHER HAND WE HAVE, TO CONTROL THIS MOVING MASS, THE FRICTION OF A FEW SQUARE INCHES OF BRAKE SHOE IN CONTACT WITH A ROTATING WHEEL.

BRAKE SHOE FRICTION AND TRAIN RETARDATION RESULTING THEREFROM VARY WITH LEVERAGE, PRESSURE, TEMPERATURE, DURATION OF CONTACT, LOCATION OF BRAKE SHOE ON WHEEL, BRAKE MECHANISM DESIGN INVOLVING ABILITY TO ALTERNATE AND GRADUATE BRAKING POWER ON THE TRAIN, AND A HUNDRED OTHER FACTORS WHICH ENTER INTO THIS MOST COMPLEX AND INVOLVED BRANCH OF AIR BRAKE ENGINEERING.

AIR BRAKE ENGINEERING IS MAINLY CONCERNED WITH THE FLEXIBLE, RELIABLE AND EFFECTIVE APPLICATION OF FRICTION TO PROPERLY CONTROL ALL TRAFFIC MOVEMENT BY RAIL.

Suggested by the

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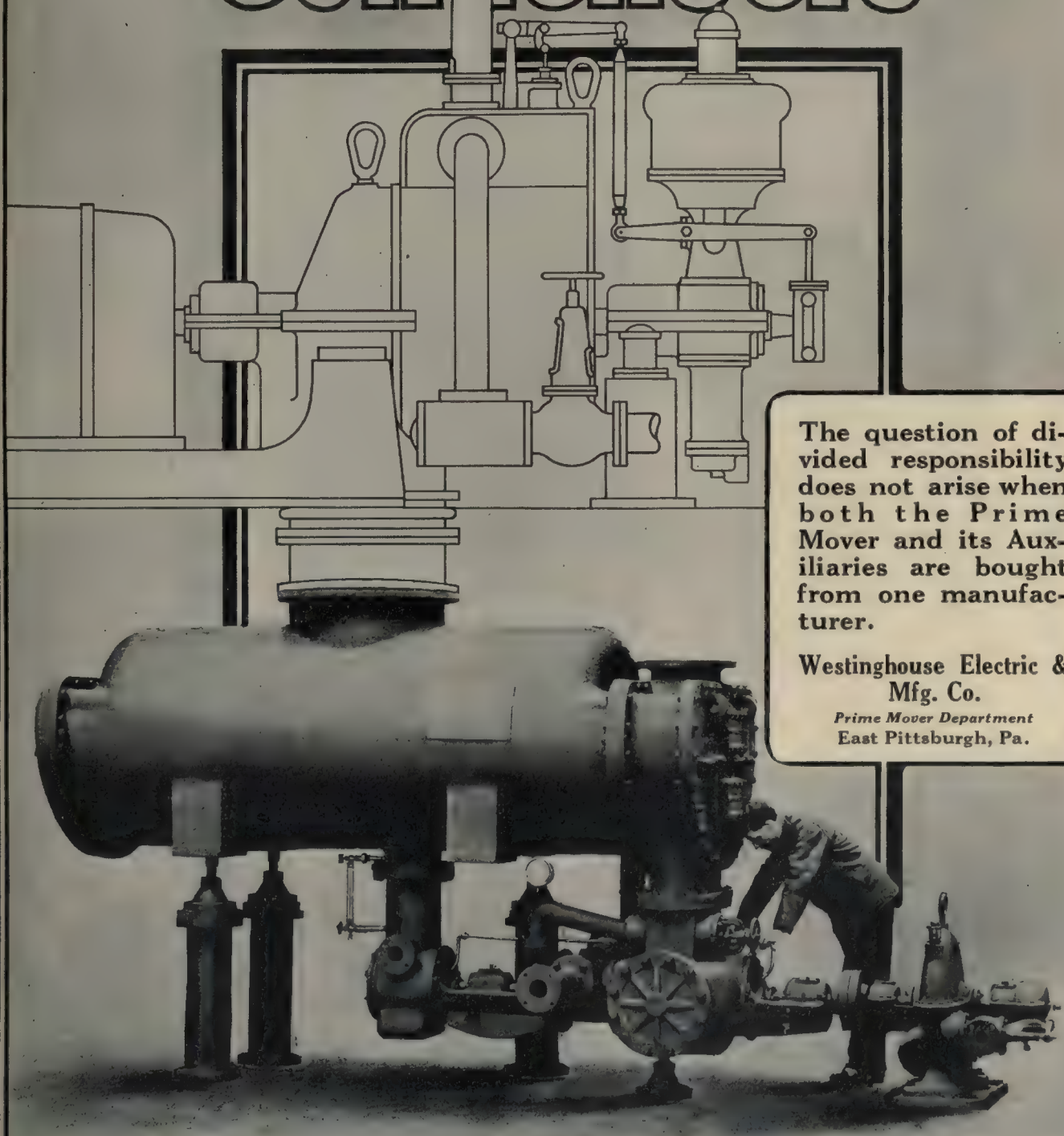
Works: Wilmerding, Pennsylvania

PITTSBURGH: Westinghouse Building
CHICAGO: Railway Exchange Building
NEW YORK: City Investing Building
ST. LOUIS: Security Building

Westinghouse Surface Condensers



The question of divided responsibility does not arise when both the Prime Mover and its Auxiliaries are bought from one manufacturer.

Westinghouse Electric & Mfg. Co.
Prime Mover Department
East Pittsburgh, Pa.

PUBLISHER'S PAGE

"For General Excellence"

The International Jury of Awards, Panama-Pacific International Exposition, has awarded a Medal of Honor for general excellence and superiority to the McGraw Publications, which include the

Electric Railway Journal

This is the highest award conferred upon a publication.

Readers of the Electric Railway Journal will be gratified by the endorsement of their judgment in selecting the Electric Railway Journal as the publication on which to rely "For General Excellence" in its text and advertising pages.

ELECTRIC RAILWAY JOURNAL

Patch Bituminous Asphalt with a KOEHRING HOT MIXER

Cuts patching costs

Write for *authoritative* figures to prove the economy

—cuts your costs way below your best possible figures in remelting and remixing by stationary plant, or having the work done under contract—and this means a cut, *not* in remelting and remixing costs *alone, but in the total cost of ripping up, remixing and relaying old material.*

Besides think of the flexibility of this smaller unit. Haul it from job to job behind a car, use trolley power.

Give this cost-saving hot mixer a *hearing*, especially on its cost-cutting claims for patch work.

800 square yards per day, new 2 inch material.

That's what this mixer can do per day with new 2 inch bituminous material.

Also mixes concrete,—disconnection of asphalt tank and blower and connection of water tank turns it into concrete mixer with capacity of 180 square street yards *per hour.*

Write for cost figures of electric railways which are using this mixer—and remember, its costs-saving justifies its use even if you have a stationary plant.

KOEHRING MACHINE CO.
MILWAUKEE, WIS.

Re-melting and Re-mixing Old Asphalt

JOHNS-MANVILLE SERVICE
COVERS THE CONTINENT

THE purchase of any meritorious article is in reality an investment that yields interest on its performance.

When a product falls down, due to an inexcusable fault, it immediately becomes a liability.

We believe that we are justified in saying that J-M Products stand in the investment class, because they **are** meritorious. And so as that they will remain in that class we back them up with J-M Responsibility, which really underwrites the investment and assures the income from that product in your service.

The way to buy Electrical Protection consistently is to always order "Noark" Fuses

Often an article can be so consistently good that the user loses his perspective on its real merit. This concern was like that one.

These customers were so accustomed to good fuse protection that there was no novelty in it. They became so used to "Noark" Service that they "blew" themselves to a new lot of cartridge fuses—with the accent on the "cartridge"—

The moral that this taught was a good one for both of us.

They learned that a good "Noark" fuse at a few cents was a safety valve for a device that cost many dollars.

And we learned that by being consistent in making a fuse that gives positive protection that we not only interest new buyers, but sell present users over and over again.

We would like you to try "Noark" fuses.

A Standardized line of Underground Distribution Boxes that will conform to any special requirement—"Noark" Subway Boxes

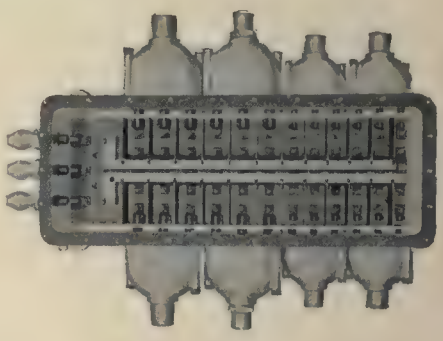
The fact that it is difficult to predict underground distribution box requirements and also that these requirements vary greatly, has prompted a demand for a distribution design that is flexible. A line that will permit of any arrangement of branch circuits, bus-bars, fusing, lugs, etc.

This condition has been studied and met in the design of "Noark" Subway Boxes.

The undesirable features of distribution boxes made "special" and the delay incident to their manufacture is thus eliminated and, furthermore, the unit construction of this line is an economy to the buyer. All the elements of these boxes have been standardized so that any combination of circuits, fusing and feeding can be made without entailing delay in shipment or extra expense.

The structural features of these Boxes are beyond criticism both as to mechanical and electrical features.

Let us quote you on your needs—Now.



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For the Good of the Service

Equally as important to the railways as the **design** of a signal is the permanence and the experience of the organization which backs the product.

Long ago the United States Electric Signal Company laid out their policy on the theory that **experience** and **conservative engineering** are of greater value to the buyer than experimentation and sales-enthusiasm.

And that is why in all announcements prepared by this company every statement can be substantiated by **facts.**

When it is stated that **United States** electric signals will do a certain thing—no discount need be placed on the assertion—they will **do it.**

It is our earnest desire to establish relations of mutual benefit with the railways.

We believe that this can be accomplished only on the basis of RELIABILITY in statement and in product.

Don't you?

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United States Electric Signal Co.

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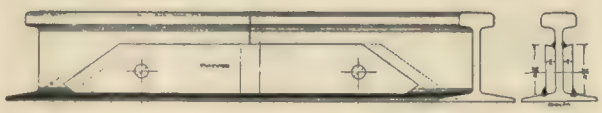
WHAT'S THE ANSWER?

"INDIANAPOLIS" WELDED JOINTS

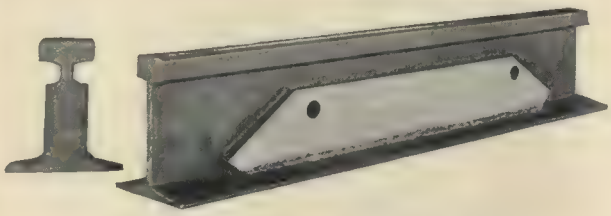


"Simplex" Joint for High Tee Rail

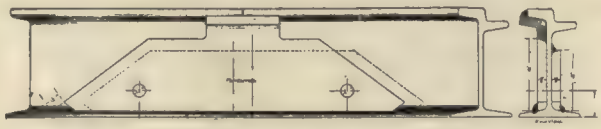
"Simplex" Joint for Guard and Girder Rail

More than fifty (50) street railways, including the largest all over the country, have installed over ten thousand (10,000)

"INDIANAPOLIS" WELDED JOINT AND BONDING PLATES



"Simplex" Joint for High Tee Rail



"Apex" Joint; Supporting Head on Gauge Side for Guard and Girder Rail

A single joint or any number can be economically applied by

One Man

With an

Indianapolis Portable

ELECTRIC WELDER

he can make a continuous jointless track. Track of ideal construction for highest efficiency and maximum economy in operation.

NO BOLTS—NO BONDS—NO JOINT MAINTENANCE

Indianapolis Welded Joints

have greater **strength** and **conductivity** than the rail itself.

The **cost is less** than any other type of welded joint, and in many instances less than a mechanical bolted and bonded joint.

Get an estimate on reclaiming old track, it may **save you Thousands of Dollars.**

Get figures on these joints for new construction and **insure against Joint and Bonding Troubles.**

"Apex" Joint; Supporting Head on Gauge Side for Guard and Girder Rail

Small and medium size properties can now have the advantages heretofore only possible for large systems.

Large systems use the INDIANAPOLIS method extensively for isolated installations and repairing broken rails.

Maximum efficiency in operation is possible by the use of the INDIANAPOLIS WELDER AND JOINTS.

Write for detailed information

Indianapolis Switch & Frog Company, Springfield, Ohio

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A Grand Prize

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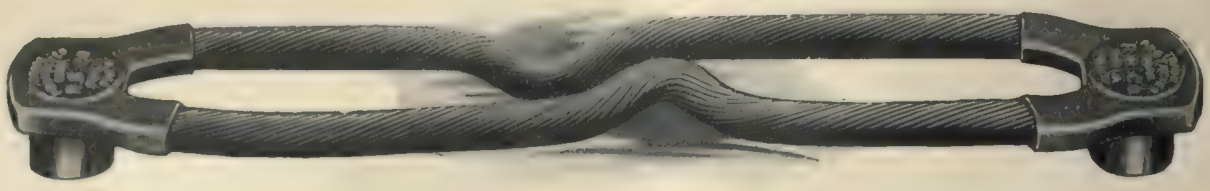

Type F C Bond

Type P 4 P Bond

"The Bond with the 'Shot-Over' Sleeve"—Use It

Because its terminals are made of soft, dense copper, forged to shape in dies. They are very soft and ductile and will not crack under compression.

Because the body of the bond is made of pure lake copper, in both cable and flat wire types. This gives you a flexible bond, one that absorbs vibration perfectly and one in which the strands won't break or crack.

Because body is forged and welded to the terminals by a special process; and on every "Protected" Rail Bond, whether compressed terminal type, pin driven type or duplex stud type, this provides a mechanically protecting sleeve—a "shot-over" sleeve—around the strands at their point of emergence from the terminal. It allows the cables or wires to emerge from the terminals in their original form, neither flattened, distorted, reduced in area or burnt.

In every "Protected" Rail Bond, where vibration is most severe—at the junction of terminal and strand, you get new, live, unburnt, mechanically protected copper to absorb it. This is why "Protected" Rail Bonds don't crack at this point.

In considering your bonding, remember that "Protected" Rail Bonds are furnished in both compressed terminal and pin driven types; remember that every one has the valuable "shot-over" sleeve features; and remember that the proof of their service lies **in the eighteen years' experience behind them and in the over eight millions that are now in use.**

Wouldn't our broad experience in connection with every class and kind of rail bonding problem be of great value to you right now?

It is yours for the asking, without the slightest obligation on your part.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

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Hudson Terminal

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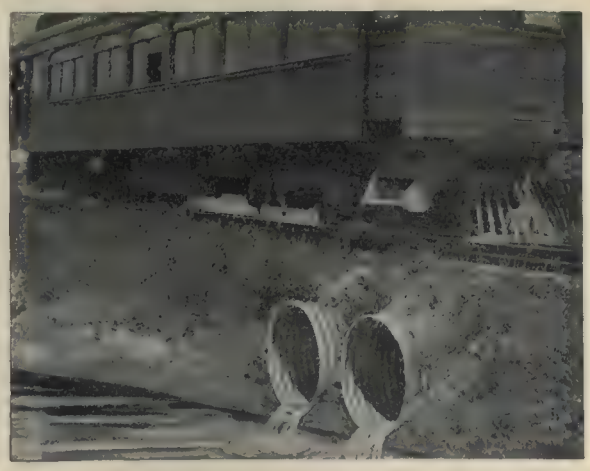
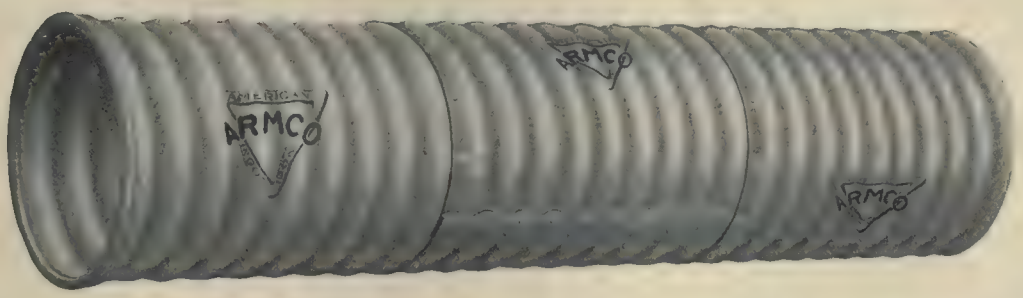
ARMCO IRON
Resists Rust





The Purest and Most Even Iron Obtainable Goes Into

ARMCO AMERICAN INGOT IRON CULVERTS

This means that every chance of that rapid corrosion, which is so destructive to ordinary iron and steel, has been removed. It has become known that if all impurities were eliminated from iron in the making, and perfect evenness of physical structure attained, it would defy deterioration on exposure to the elements or to the soil.

Armco Iron is the nearest approach to this ideal that has ever been achieved commercially. Armco Culverts have effected important economies for thousands of users. *Get Armco Culverts for permanence.* You owe it to the efficiency of your electric railway system.

If you want to know what *Armco Culverts* have done for many users, send for the data. There are no dissatisfied *Armco Culvert* users.

Write the Nearest Manufacturer for full information and prices on Armco Corrugated Culverts, Siphons, Sheets, Roofing and Formed Products.

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Delaware, Clayton
Delaware Metal Culvert Co.
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You Can't Afford to Lose

what this trolley equipment will save

Both wheels and harps last longer and the wear on all overhead is greatly reduced. You save there on renewals and repairs.

The wheel is self-lubricating and needs no attention once installed. That saves labor, lubricant and the car roofing.

Improved design eliminates current waste, resulting in better and more reliable service. That influences public opinion in your favor and brings increased revenue.

So there's a gain for you all along the line—a positive gain that will follow the use of the new, perfected

V-K OILLESS TROLLEY WHEEL and NON-ARCING HARP

The self-lubricating feature of the V-K OILLESS WHEEL is the great thing about it. This consists of a patented, bronze gauze bushing impregnated with a graphite composition—practically indestructible—easily interchangeable. It has high conductivity enabling current to pass right through the bearing because the bearing is not surrounded with an insulating film of oil or grease found in usual practice. Changes in temperature don't affect its lubricating qualities. The wheel is uniformly well balanced—gives smooth traction always, with perfect contact and the minimum of wire wear.

Here's what the V-K NON-ARCING HARP will do. It is equipped with a patented gripping device that holds the pin firmly and prevents all arcing. It's the loose-fitting pin that wears and burns out the hole, wastes current and scraps the harp early. The V-K locking device is simple—easy to operate—and can not get out of order. The contact springs of the harp prove valuable principally as cushions for the wheel to prevent dewiring from shock.

Now—just measure the qualifications of the V-K Equipment against what you are using. Any kind of test of the combination will prove its superiority.

Send for our new illustrated catalog. It contains full information on sizes, styles, etc., covering our whole line of wheels and harps.

More-Jones Brass & Metal Co.

St. Louis, Mo.

Manufacturers of Trolley Wheels and Harps, Contact Springs, Motor Axle Bearings, Armature Bearings, Truck Journal Bearings, Air Compressor Bearings, Armature Babbitt Metal and similar products.

"Golden Glow" on Terre Haute, Indianapolis and Eastern

GOLDEN GLOW

Interurban headlights are interchangeable with 4-ampere arc lights, without additional resistance

Over the 200 Mark—

When the New York, Westchester & Boston ordered its new Pressed Steel cars equipped with

GOLDEN GLOW
TRADE MARK REG.

headlights, it was the 201st prominent company in 18 months to widely adopt these lamps.

Do you know what it means when the biggest and most progressive companies in every state agree on the superiority of a single product?

Do you know of any other article of electric railway equipment which has had such extensive installation in such a short space of time.

Golden Glow headlights showed the way to "Safety Illumination" with incandescent bulbs, and they continually prove their greater efficiency.

In recent tests against competing headlights, **using the same bulbs,** Golden Glow headlights gave from 10 per cent. to 40 per cent. greater illumination, thus proving our statements that the reflectors in Golden Glow headlights are the only scientifically correct mirrored glass reflectors for headlight purposes.

Moreover, Golden Glow lamps carry their bulbs in the optically correct position for focusing, are made of pressed steel throughout, parts are electrically welded and finished in baked black enamel. They are dust and weather-proof.

They project a further central beam, give a wider dispersed light, and therefore a more satisfactory illumination than other incandescent headlights.

This is why over 200 railways have made Golden Glow their standard.

Our New Catalog, No. 364-J, describing the entire Golden Glow line, will be sent out only on request. Write for a copy.

219 East South Street — **The ESTERLINE Co.** — **Indianapolis, Indiana**

This Tool Steel pinion was followed in careful test by a large railway line.

It costs them $6.00 and freight, and according to their records it has given more mileage than the aggregate they obtained from nine (9) of the untreated pinions previously used.

Assuming that their untreated pinions cost them but $2.00, which is a very low estimate, this pinion has done the work of $18.00 worth of soft pinions.

MAKING A NET SAVING OF $12.00 WHICH GOES ENTIRELY TO DIVIDENDS

This omits the savings in freight on eight pinions and in installation costs, etc.

According to July, 1913, AERA, gross earnings from fares are divided up so that on the average 6.2% or 31/100 cents out of each 5c. fare goes to dividends. On this basis

$$$ It Takes 3,720 5c. Fares to Equal the Earnings From this One Tool Steel Pinion ¢¢¢

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And yet a few railway officials still worry their heads off over a picnic, outing or holiday, but pass up the direct-to-dividend savings from Tool Steel gears and pinions without consideration.

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It is always *prompt* and always *dependable.* The reason is obvious—we want your good will—want your *future* orders as well as *present.*

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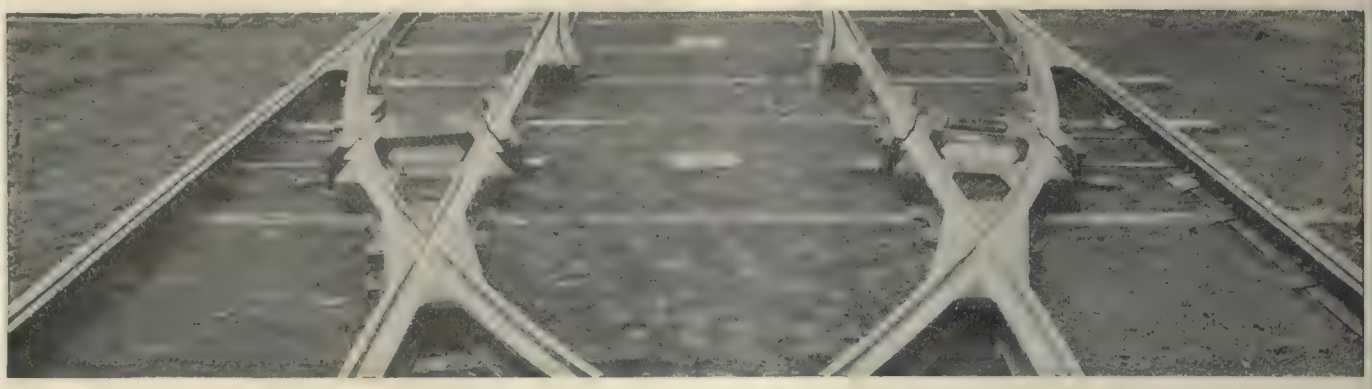

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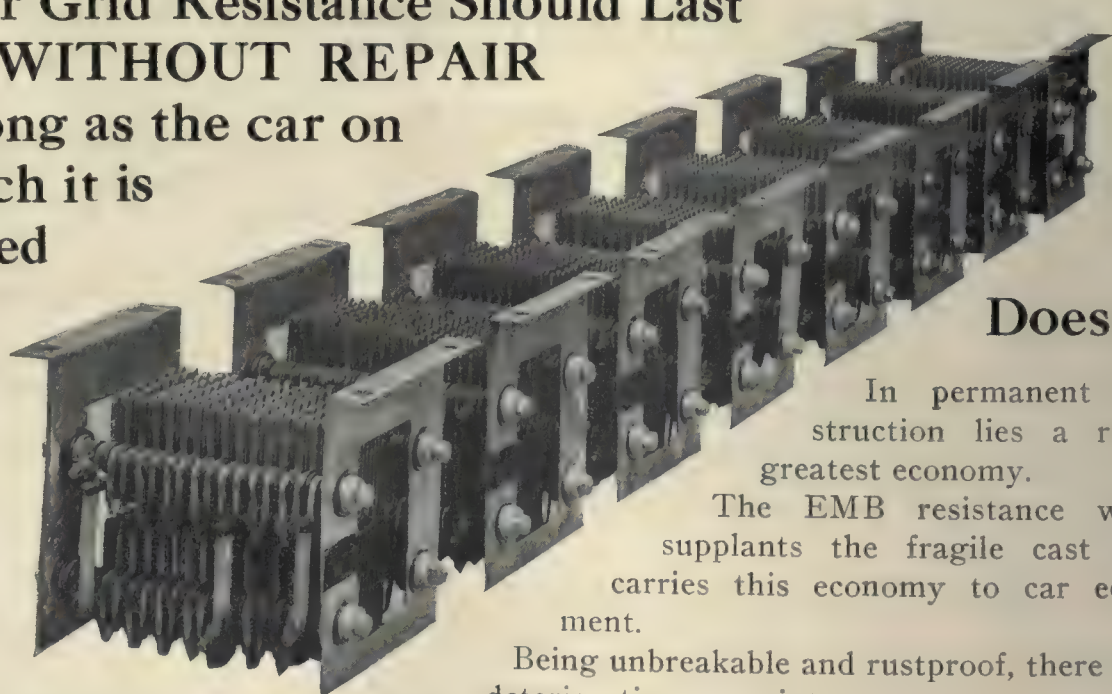

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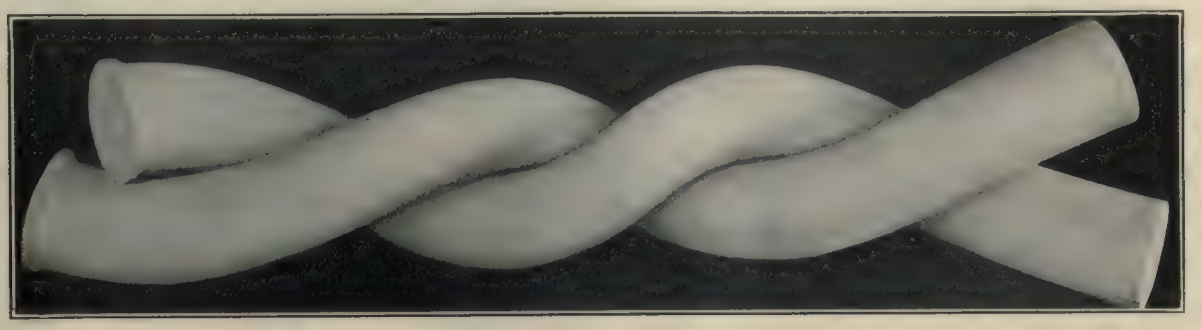

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The gearing is the vital point in the car since all the power of the motor is transmitted by it to the driving wheels. The strength and wearing qualities of the gearing have a great effect upon cost of operation.

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Electric Railway Journal

Published by the McGraw Publishing Company, Inc.

Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLV NEW YORK, SATURDAY JUNE 26, 1915 No. 26

MORE TIME FOR STUDY OF SAFETY CODE

The United States Bureau of Standards has very wisely postponed the conference on the proposed National Electrical Safety Code, which had been scheduled for July 1 and 2, to Oct. 27. This gives practically four months of extra time for study, very much more than the original time available. It was a practical impossibility for railway men interested in this matter even to read, much less to digest the recommendations of the proposed code which are contained in two circulars aggregating 187 pages of standard Bureau of Standards form. While the heat of summer is not conducive to study, railway men are accustomed to working under conditions not always delightful. They will no doubt plan to include these circulars in their programs of summer reading. They might well be made the basis of conferences. It is safe to say that never has a proposed set of rules been inaugurated with more care than that being exercised in the present instance. If rules objectionable to the electric railways get by the October conference, especially after this extra study period has been allowed, the railways will be to blame.

ARBITRATION IN CHICAGO

After the conclusion of the negotiations in Chicago which lead up to arbitration, the Surface Lines published a statement in the daily papers under the heading, "Arbitration Has Won." This statement appears in abstract elsewhere in this issue. It defines the issue at point as the acceptance of arbitration, and the companies, the men, the citizens of Chicago and the mayor of that city should all be congratulated upon the adoption of this policy. Industrial conflicts may not be so serious as those between nations, but in principle there is little which distinguishes them because both are based upon the idea of breaking or wearing the other side down. Surely the time has gone by when people really believe that the best way of convincing a man that his opinions were wrong is by knocking him on the head, especially when one has to do business with him later. Violence never proved anything in regard to the real merits of the affair at issue. The statement mentioned above, issued by the Chicago Surface Lines, is particularly happy in bringing out not only the real point at difference in the dispute but also the present viewpoint of corporation managers as regards the proper functions of utility companies. They are no longer considered by their owners as purely private corporations but as public agencies with definite duties to perform. The companies can properly be held by the public strictly accountable for the performance of these duties and, in return, are entitled to protection by the public against excessive demands of labor and strikes. This protection was given in the Chicago case, both by a pronounced public sentiment and by the action of Mayor Thompson in insisting upon real arbitration.

THE COLOR LINE AND THE JITNEY

Many people seem to think that the only thing which the jitney owner has to worry about is how he is going to get enough money to pay for all his repairs and to buy a new machine when the one which he is using at present wears out. But this is not all. One of the questions which the jitney owner has yet to solve is the color question, and it may prove an embarrassing one. So long as the jitney remained an unregulated private vehicle operating at the will of the driver, he could take such passengers as he chose, and he could refuse to carry others. Just as soon, however, as he began to operate on regular routes and charged a definite fare, he became a common carrier, and as such is obliged to carry anyone who presents himself or herself. The question has already come up in several Southern cities and is likely to arise in quite a number of others. Will it mean that certain seats in every jitney will be reserved for colored people? Or will separate cars have to be run? If the latter, what redress would colored citizens have if the service of jim-crow jitneys on any particular route is inadequate? There is still a good deal to be learned about the jitney before it can be considered an established transportation agent.

THE SCIENTIFIC SPIRIT IN THE SHOP

One does not have to look very far to see that the spirit of investigation is at work in the electric railway shop as well as in the college laboratory. The same principle underlies the careful analysis of the mileage obtained from different kinds of gears and pinions and the counting of the numbers of millions of bacteria in a cubic centimeter of liquid. The purpose in each case is to obtain some knowledge which will improve conditions in shop maintenance and hygiene or medical practice respectively. Rule-of-thumb methods in all lines of activity enjoy a waning popularity, and analytical methods are supplanting them. Devices for testing one quantity or another are seen more and more in the shop, on the car or in the power house. This is illustrated in the statements made by W. L. Allen in his paper delivered before the Central Electric Railway Association and abstracted elsewhere in this issue. Mr. Allen endeavors to outline the ways in which purchasers

of gearing can determine what they are getting. As gears and pinions and other supplies come to be purchased more and more to specifications such tests will be increasingly necessary. While it is impracticable for most companies to own all of the machines described by Mr. Allen and the corresponding testing equipment needed in other lines, yet some of these devices can be owned, while neighboring or even distant laboratories can be depended upon for tests beyond the capacity of local equipment. The manufacturers, of course, have well-equipped laboratories, and much more extensive use could be made of college laboratories by the railways than is the present practice. If the desire for test data on materials and structures exists the information can be secured in one way or another.

THE BAY STATE ARBITRATION DECISION

The decision of the arbitration board in the Bay State Street Railway wages case, abstracted in another column, is of interest from several angles. Like many other findings in industrial disputes, it sets a compromise between the contentions of the two parties, giving the men a smaller increase in pay than was demanded by them and yet awarding new rates imposing a serious additional burden upon the company itself. This burden cannot be met by present revenue, according to officials of the company who know, as few outsiders do, the struggle to make ends meet which has been going on within the system during the past decade, and if a good and adequate service is to be rendered and if the investor is to receive anything like a fair return upon his capital, just one course remains. Application must be made to the Public Service Commission of Massachusetts for authority to increase the price of transportation. Commenting for the press upon the finding, President Sullivan states that the company has postponed as long as possible an increase in rates, but that it will now get ready to act in this direction. With the Middlesex & Boston decision as a precedent, the outcome ought to be favorable to the road. This phase of the problem can be left for future comment, with the single remark that what, according to the last census report, was the world's largest electric railway system in point of mileage stands in front of an economic problem whose solution is sure to be as enlightening in method and as interesting in detail as have been the proceedings in the arbitration just closed.

The decision itself contains a revolutionary fiat in establishing a minimum wage for miscellaneous employees, such as shopmen, power plant workers, line and track maintainers, etc., after one year's service. More than half of the labor outside the blue uniformed men will be affected by the $2.25 minimum named. How such a sweeping basic compensation rate will work out remains to be seen, but there is clearly a pretty small margin of profit in modern street railroading on which to build a structure resembling even the remotest degree the economic mansion of the famous automobile manufacturer whose products are the jitney and its uncommercialized relations, who toil not even if they spin. The practice of dealing with a score or two of trades with all their individual complications on anything less than an extended consideration must of necessity lead to results more or less experimental.

The blue uniformed men receive by the award less than their maximum demands by 5 cents per hour, but the graduated scale was shortened from eight to six years and the former maximum increased from 28 to 30 cents. A considerable part of the increase granted these employees conforms closely to the rates offered them in conference prior to the arbitration. The latter has been costly, but if the estimated addition of $300,000 in two years to the company's expenses is correct as a result of the decision, it would seem that the men came off fairly well and ought to accept the finding with good grace. The chairman and deciding member held to the opinion that the company should pay a standard of wages not defined by the financial condition of the road nor apparently influenced by its ability to fill the ranks of its employees at the existing scale. Whether one concedes this or not, the company's agreement to the arbitration means that it will stand by the finding. The suggestions of the board with respect to the standardization of classifications among miscellaneous employees open up another field for study, but the great interest in the decision lies in its relation to the future policy of the company with respect to the charges to be made for its service.

PRECAUTIONS FOR THE FOURTH

Fortunately there has been marked progress in all cities during the last ten years toward the establishment of a "sane fourth." It was not many years ago that railway companies had to make many special provisions for the day in the way of fire and accident precautions. Not only was the hose unreeled in carhouses and provisions made to direct streams of water promptly on the roof or elsewhere where a fire might start, but motormen had to be particularly careful not to run over children who were setting off crackers in the street and oblivious of everything else.

There are still cities where the day is celebrated in the old way and there these precautions will still be maintained. Even where individual displays of fire works have given place to displays by the municipality or by clubs, the danger is still present, although it may be less, and care about guarding against fire is desirable. It would be a good plan on all properties during the coming week to have an inspection to see whether the fire pails are filled, the hose in condition, the extinguishers and other apparatus ready for putting out an incipient fire promptly.

Preparations should also be made to handle the extra traffic which is always an accompaniment of our principal summer holiday. In the spread of the "sane fourth" idea, the railways as well as the public have been gainers. Nevertheless, we feel confident that most managers will breathe a sigh of relief when the fourth has passed without material casualties for which the company is responsible.

CONTINUOUS VS. NOMINAL RATING OF RAILWAY SUBSTATION MACHINERY

In last week's issue of the ELECTRIC RAILWAY JOURNAL the situation regarding the rating of substation machinery was briefly outlined. As the subject is coming up next week at the A. I. E. E. convention at Deer Park, Md., some further facts may be of interest.

Some of the arguments which are advanced against the continuous rating for substation machines are as follows: 1. Machines will be rated higher than hitherto and prices will be raised to correspond with the rating. 2. The continuous rating corresponds with neither the average nor the peak load of the substation, whereas the nominal rating corresponds roughly with the average load, and the overload capacity with the peak load, thereby enabling the railway engineer to determine by rule-of-thumb the size of machine required to perform a given duty-cycle. 3. Owing to the fluctuating character of the load on most railway substations, it is safer to obtain a machine which is too large for the service, than to run the risk of obtaining one which is too small. The manufacturer should therefore be given an opportunity to supply a machine of generous design, and in order to make competitive bidding fair, the requisite margin should be standardized and incorporated in the rating. 4. Substation operators have become accustomed to the nominal rating which resembles the old A. I. E. E. rating and a change is likely to lead to misuse of machines.

The first of these arguments is based upon three assumptions: (*a*) that machines are habitually given the maximum rating which their performance warrants; (*b*) that the new system of rating permits higher temperatures than the old, and (*c*) that manufacturers base their prices upon nameplate markings rather than upon production costs. On the other hand the following can be said: Regarding (*a*), it is probable that no synchronous converter ever sold attained the three temperature limits set by the old standardization rules. Regarding (*b*), the maximum observable temperature rise for continuous operation at rated load is the same in the old and new systems of rating for the type of insulation used in railway substation machinery. The temperature rises allowed for overloads under the old rules were recognized by the manufacturers as excessive and were seldom attained.

The second argument is based upon the further assumption that the capacity of a machine for continuous and short-period loads is completely specified by its nominal rating. The fact is, however, that the capacity of a machine cannot be fully stated by one rating, as it requires for its complete specification the enumeration of two independent physical quantities, the thermal absorption and the thermal dissipation. Any attempt to combine these quantities is absolutely futile for, while the specification of both of them separately calls for a machine of definite thermal characteristics, the specification of any rating which combines them may correspond to an infinite number of different kinds of machines. A given fluctuating load can obviously be most economically carried by a machine of certain definite characteristics. Hence the nominal rating of a machine cannot indicate its suitability for carrying a given fluctuating load. The only practical way to ascertain what machine is best suited for a given duty-cycle is to give a full statement of the duty-cycle to the manufacturers, making all necessary allowances for contingencies. The manufacturers will apply their knowledge of the thermal characteristics of their machines to the solution of the problem. This substitutes scientific engineering for rule-of-thumb processes, which, although easy to apply, are likely to lead the user into trouble. Thus the under-rating of machines, as by the use of a nominal rating, results in substation operators being given a false impression of the capabilities of their machines, tending to underloading, with resultant necessity for excessive substation equipment. Furthermore comparative bids obtained on machines to meet a given duty-cycle are much more fair than those based upon a given rating because, as stated above, equal ratings do not necessarily mean equal machines, whereas equal ability to meet a given duty-cycle reaches the real essence of the problem.

The third argument is a plea for the institute to provide a margin to allow for deficiencies in engineering estimates. It is hard to see why each engineer should not make his own contingency allowance in stating the load conditions upon which bids are to be based. Indeed, the futility of trying to do otherwise has been proved in the answer to the second argument already given.

The fourth argument neglects to take into account the fact that many railways are operated from d. c. power stations, the generators in which are rated in accordance with the A. I. E. E. continuous rating. Hence the retention of the nominal rating for substation machinery will result in operators having to change their perspective when they go from a d. c. power station to a substation or vice versa. Furthermore this argument does not apply to railway substations with any greater force than to lighting substations, and no difficulty has been anticipated or experienced by the lighting men, due to the change in rating. It should also be remembered that whatever inconvenience may attend the change from nominal to continuous rating will be of a temporary character, while the retention of the nominal rating will lead to permanent inconvenience, due to the difference which would always exist between the rating of substation and power-station machines.

It is understood that the standards committee of the institute will recommend the continuous rating, allowing the nominal rating to be used, however, where it is not convenient to use the former. This will give an option and the resulting custom will determine whether or not the nominal rating can be dropped later. This action is conservative, and if purchasers will buy on the standard basis the nominal rating will disappear from lack of use.

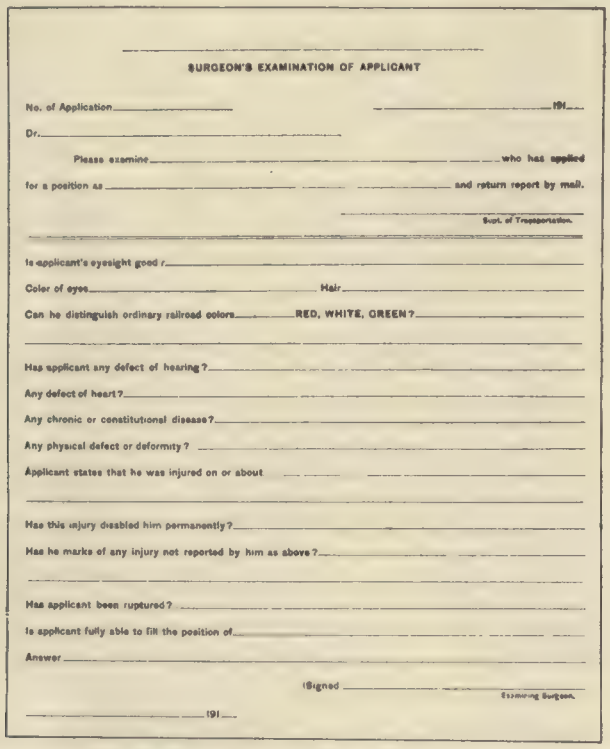
Chicago Elevated Medical Methods

An Account of the Methods of Examining the Sight, Hearing, Color Sense and Mentality of Applicants on the Chicago Elevated Railroads

BY DR. H. E. FISHER, SURGEON ELEVATED RAILROADS OF CHICAGO, ILL.

About two years ago the Elevated Railroads of Chicago employed a surgeon to take charge of its medical department and required all employees except those in the general offices and at stations, to pass a medical examination. The surgeon's office was located centrally and was completely equipped with modern devices for making examinations, as well as for ministering to injuries and physical ailments of employees. Recent editorial comments in the ELECTRIC RAILWAY JOURNAL on this department's work have produced numerous inquiries. While some of these have been answered by letter, it has been considered advisable to publish an account of the work done by departments.

The applicant for employment, after being accepted by the transportation department, is sent to the surgeon's office, where he presents his original application and an order for his medical examination. This order



SURGEON'S EXAMINATION OF APPLICANT

No. of Application _____ _____ 191...

Dr. _____

Please examine _____ who has applied

for a position as _____ and return report by mail.

_____ Supt. of Transportation.

Is applicant's eyesight good? _____

Color of eyes _____ Hair _____

Can he distinguish ordinary railroad colors _____ RED, WHITE, GREEN? _____

Has applicant any defect of hearing? _____

Any defect of heart? _____

Any chronic or constitutional disease? _____

Any physical defect or deformity? _____

Applicant states that he was injured on or about _____

Has this injury disabled him permanently? _____

Has he marks of any injury not reported by him as above? _____

Has applicant been ruptured? _____

Is applicant fully able to fill the position of _____

Answer _____

(Signed _____ Examining Surgeon.

_____ 191...

CHICAGO ELEVATED MEDICAL EXAMINATIONS—SURGEON'S EXAMINATION RECORD BLANK

is reproduced in the first form shown. The upper portion of this form is filled in by the superintendent of transportation and the lower portion is for the record of the examining surgeon. Upon receipt of this order the applicant is required to fill out a second form, also shown. This form is self-explanatory, and its main object is to secure a record of the applicant's past medical history over his signature, which may be used for future reference in case of injury. It is always desirable to know whether the previous medical condition had any bearing on the results of an injury received at a later date. At the time of examination this medical history is also used to determine whether the applicant is a safe risk for handling the work he is seeking, or whether he has any incurable or serious constitutional disease. If the medical examiner is satisfied with the applicant's previous medical history, he begins a practical examination of the special senses, namely, sight, hearing, color perception and mentality.

SIGHT

In testing the sight the standard Snellen's test letters are used. One line of letters is displayed at a time in order not to confuse the applicant, as is frequently the case when charts have more than one line. These charts, illustrations of which are shown, are placed in a test-card rack with a black background, the letters being illuminated from both sides by incandescent lamps. The applicant is seated 20 ft. away from the rack, which is placed on a level with his eyes. A trial frame is then

File No. _____

STATEMENT MADE TO MEDICAL EXAMINER BY APPLICANT

1. What is your Full Name? _____ 2. When were you Born? _____
3. Have you ever been Examined by this Company before? _____
4. Where? _____ When? _____ For what Position? _____
5. How long have you been in the service continuously? _____
6. Are you Married or Single? _____ 7. What is the name of Wife or Husband? _____
8. What are the names of your Children (if married give married names and addresses)?
Sons _____
Daughters _____
9. What are the names of your Parents, Brothers, Sisters now Living?
Father _____ Mother _____
Brothers _____
Sisters _____
10. If either Parent or any Brothers or Sisters have died, give cause of death in each case? _____
11. Have either of your Parents or any Brothers or Sisters had Consumption, Rheumatism, Insanity, Cancer or Scrofula? _____
12. Have you had any of the following:

Appendicitis?	Constipation?	Spitting of Blood?
Asthma?	Hay Fever?	Stricture?
Bronchitis?	Hemorrhoids?	Sun Stroke?
Chronic Dyspepsia?	Pleurisy?	Syphilis?
Dizzy or Fainting Spells?	Pneumonia?	Urinary Trouble?
Dysentery?	Rheumatism?	
Fits?	Rupture?	

13. What long or serious Sickness or Sicknesses have you ever had? _____
14. Where? _____ When? _____
15. When, where, how long and with what were you last Sick? _____
16. What injury or injuries have you ever received? _____
17. Where and when? _____
18. When were you last unable to work on account of injury? _____
19. Were you ever Operated upon (if so, when, where and for what?) _____
20. To what extent do you use intoxicating Liquors? _____
21. Have you now or have you ever had any Disease, Tumor or Ulcers or any Physical Defect except as above stated? _____
22. Do you carry Accident, Health or Life Insurance (if so, give Name of Company and Amount?) _____
23. What position are you making application for? _____

I certify that my answers to the foregoing questions are recorded above correctly and truthfully.

Date _____ 191... Signature of Applicant _____

CHICAGO ELEVATED MEDICAL EXAMINATIONS—EMPLOYEES' MEDICAL HISTORY BLANK

placed on his face and one eye is covered with an opaque disk. After this has been done the room is darkened and the applicant requested to read the letters displayed. Normal 20/20 test letters are used first, and then the increased sizes are shown until one line is read correctly. A record is made of the line so read, and then the other eye is tested in the same manner. Finally, both eyes are uncovered and the applicant is asked to read the letters in order to obtain a record of the combined vision.

Requirements

The classification used is as follows:

Class 1. All those handling trains and train signals, that is, motormen, extra motormen, yard motormen,

towermen, switchtenders, interlocking men, switchmen and signalmen.

Class 2. Conductors, regular guards, extra guards and student guards.

Class 3. Station platform guards, crossing flagmen, crossing gatemen and all other employees.

The requirements are as follows:

Class 1. Vision—Normal (20/20 required in each eye without glasses).

Hearing—Normal (whisper at 20 ft., acoumeter or rewind of watch at 4 ft. for each ear).

Color perception—Normal (by Holmgren's worsted color skeins and Williams' test lantern).

Employees under Class 2 seeking promotion to Class 1 must have a combined vision of 20/20 provided vision in one eye is not less than 20/30 without glasses.

Physical defects—All physical defects tending to impair the efficiency of individual disqualify.

Re-examination—Re-examination of employees in this class must be made once every two years.

Vision—Only those whose vision does not fall below normal in one eye, and 20/40 in the other, may be allowed to hold their regular or preferred runs.

Hearing—Same as requirements for entrance to service.

Physical defects—Same as requirements for entrance to service.

Class 2. Vision—Normal (20/20 required in one eye and not less than 20/30 in the other).

Hearing—Normal (whisper at 20 ft. acoumeter or rewind of watch at 4 ft.).

Color perception—Normal (by worsted and lantern the same as for Class 1).

Physical defects—All physical defects tending to impair the efficiency of the individual disqualify.

Re-examination—Re-examination of employees in this class must be made once every two years.

Vision—Combined vision must be 20/30 and not less than 20/40 in one eye, with or without glasses.

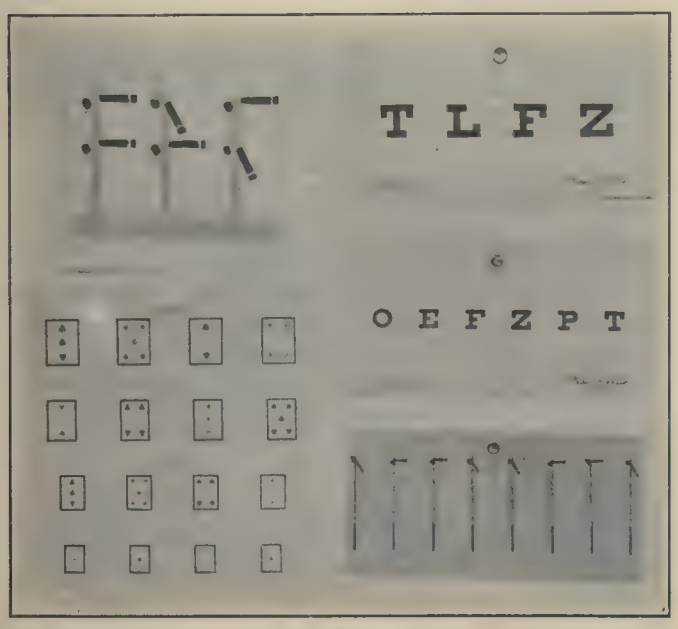
Hearing—Same as for entrance to service.

Class 3. Vision—Combined 20/40, not less than 20/50 in one eye, without glasses.

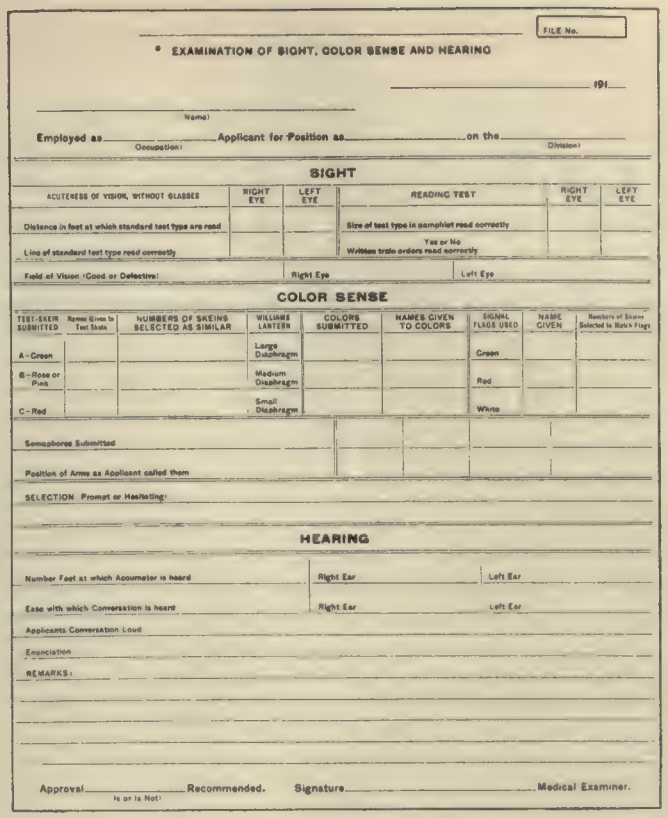
Hearing—Normal in one ear and not less than 2 ft. in the other (rewind of watch).

Color percention—Normal (worsted and lantern).

Physical defects—All physical defects tending to impair the efficiency of the individual disqualify.



CHICAGO ELEVATED MEDICAL EXAMINATIONS—VIEW OF TYPES OF CHARTS USED



FILE No.

EXAMINATION OF SIGHT, COLOR SENSE AND HEARING

191

(Name)

Employed as (Occupation) Applicant for Position as on the (Division)

SIGHT

ACUTENESS OF VISION, WITHOUT GLASSES	RIGHT EYE	LEFT EYE	READING TEST	RIGHT EYE	LEFT EYE
Distance in feet at which standard test type are read			Size of test type in pamphlet read correctly		
Line of standard test type read correctly			Yes or No Written train orders read correctly		

Field of Vision (Good or Defective) Right Eye Left Eye

COLOR SENSE

TEST-SKEIN SUBMITTED	Names Given to Test Skein	NUMBERS OF SKEINS SELECTED AS SIMILAR	WILLIAMS LANTERN	COLORS SUBMITTED	NAMES GIVEN TO COLORS	SIGNAL FLAGS USED	NAME GIVEN	Numbers of Skeins Selected to Match Flags
A-Green			Large Diaphragm			Green		
B-Rose or Pink			Medium Diaphragm			Red		
C-Red			Small Diaphragm			White		

Semaphores Submitted				
Position of Arms as Applicant called them				

SELECTION Prompt or Hesitating!

HEARING

Number Feet at which Acoumeter is heard	Right Ear	Left Ear
Ease with which Conversation is heard	Right Ear	Left Ear

Applicants Conversation Loud

Enunciation

REMARKS:

Approval (Is or Is Not) Recommended. Signature Medical Examiner.

CHICAGO ELEVATED MEDICAL EXAMINATIONS—SPECIAL SENSE RECORD BLANK

Employees over fifty years of age, or employees who require glasses to bring their vision to standard, must be examined every year. Employees who have suffered severe injury or illness must be examined before they re-enter the service.

KNOWLEDGE OF ENGLISH

Frequently the examiner has to deal with a flagman or some other employee who is unable to read or write the English language or to speak it fluently, and it is necessary to provide a test to determine just what can be seen. For this purpose charts containing various sizes of playing cards corresponding to the various lines of Snellen's test letters are employed. Samples of these cards are shown in one of the accompanying illustrations. The applicant is required to indicate or call out the name of the card he can see, in order to prepare his record. Another test chart employed is one containing various sizes of figures which most applicants are able to read.

For transportation work, only those men who can read, write and speak English are employed. Men with these qualifications are of a higher grade intellectually, and they are more easily instructed and more readily understand orders. As witnesses in court they are also more valuable, and their testimony does not necessitate an interpreter, with the usual misunderstandings. Moreover, experience has shown that men who do not understand English are more liable to accident. Injuries that appear to be the result of carelessness will upon investigation often be found to be due to ignorance of English.

IMPAIRED VISION

Applicants whose sight requires glasses to bring it up to normal or standard are refused employment for train service. The reason for this rule is that the public does not feel as safe with trainmen who require glasses as they do with those who do not wear glasses. Moreover, such men must be examined more frequently, owing to the fact that glasses change the refraction of

their eyes. Again, a man obliged to wear glasses may break a lens or leave his glasses at home and while on duty without them may cause an accident either to himself or to the public. Glasses are also a menace to the wearer in times of accident, as they may be broken and the pieces injure the eyes.

Near vision is tested by the ease with which the applicant reads and fills out his medical-history blank. The printing on these blanks conforms to the letters on the Jaeger test card for near vision. Old employees in service, who are re-examined and found to have defective vision, are sent to an eye specialist to have the error of refraction corrected. If the defect is such that it cannot be corrected safely with glasses, the employee is assigned to other work where good vision is not so important.

All employees, including shopmen, yardmen, electrical and road department men, should have their sight examined at the time of entering the service so that in case of an accident a record of their condition is available. All employees whose eyes have been injured, or who have had eye trouble, should be examined for range of vision before being allowed to resume their former duties. Neglect of this sometimes results in claims being made on the ground of impaired vision as due to an accident occurring after the return of the employee, when, in fact, the defect already existed.

Hearing

Range of hearing is tested by the ordinary backwind of a watch. One ear is closed by placing a finger over it and the watch held near the ear to be tested. The distance between the watch and the ear is gradually increased until the applicant fails to hear the rewind. Various acoumeters have been tried and discarded owing to the change in the intensity of sound after prolonged use. The ease with which the applicant hears ordinary conversation both in a whispered and normal voice, without seeing the examiner's lips, is also sufficient to determine whether any defect is present. A record is made of each ear's range of hearing, and any degree of impairment is sufficient reason for refusing an applicant, even though he is otherwise perfect.

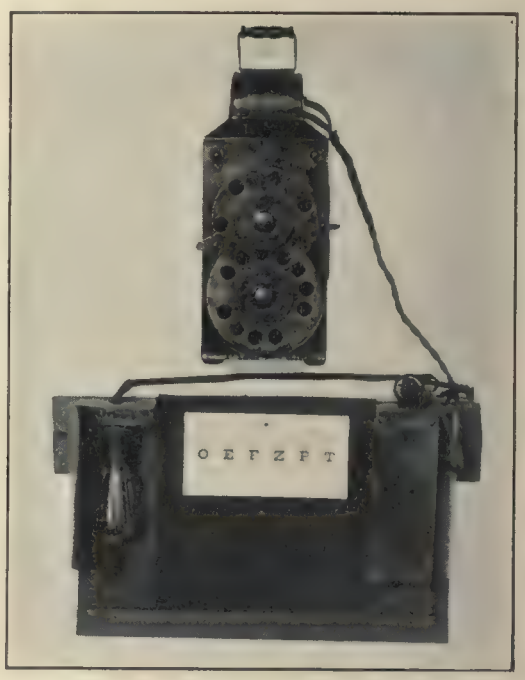
A man in the transportation service with defective hearing is a grave menace both to himself and to those associated with him. The tests in this respect are often slighted by examiners, and slightly deaf men are assigned to hazardous occupations. Even slight deafness often leads to an accident because the approach of trains is not heard. Carelessness in the examination of flagmen and gatemen for defective hearing probably causes more accidents than neglect of any other part of the examination.

Perfect hearing is essential to trainmen so that they may understand quickly and accurately train orders and other instructions, and so that passengers need not shout their inquiries. The use of bell signals is another reason for perfect hearing. A man with defective hearing may confuse the number of bell signals and so cause an accident.

Color Perception

Color perception ranks a close second to sight in railroad work. Correct interpretation of colors is a safety-first rule for trainmen at night, because they must depend largely on signals for the safety of their trains. In testing the color sense, Holmgren's worsted color-test skeins are used. The applicant is required to pick out the regulation railroad colors, red and green, quickly and with precision. Calling the various names and shades of colors is often difficult for some people because they do not know the names and colors. This condition is known as color ignorance. The railroad transportation business holds no place for a man who is color blind, color ignorant, or confused when he sees two colors at the same time.

The second color test is made with the Williams' railroad test lantern, which is shown in one of the accompanying illustrations. Every railroad company, regardless of its size, should use one of these lanterns in making examinations. As railroad signal colors, red and green, are those usually confused by color-blind persons, tests for color sense are particularly important. People may be color blind for green or for red, or for both. The lantern used by the elevated railroads is fitted with a revolving disk containing thirteen small lenses. These lenses are of various shades of red, green, blue, white and amber, and may be revolved before two apertures. On another revolving disk are small London glasses smoked to various degrees. When these smoked glasses are placed over the clear colors, they make the light appear like that of a dirty or smoky signal lamp. Two levers operating



CHICAGO ELEVATED MEDICAL EXAMINATIONS—WILLIAMS' LANTERN AND CHART RACK

small disks of frosted glass are used to make the light resemble that of signal lamps in a fog or a rain. An indication like that of a smoky signal lamp on a foggy night may also be obtained.

The Williams' lamp also has three sizes of diaphragms or openings—large, medium and small. When these are placed over the colors and the size of the apertures is changed, the appearance of a regulation switch lamp on a dark night at distance of ½, 1 and 2 miles may be obtained. During the examination the lantern is placed in front of a dark background and all other light excluded. The applicant is seated 20 ft. from the lantern and each eye is tested separately. He is requested to call the colors quickly and correctly, and any confusion merits rejection.

Another test often used is to place two red signal lanterns, two green ones and a white one in a dark room and request the applicant to pick out the colors called by the examiner. Signal flags of various colors may also be employed in a similar test. Another simple method sometimes resorted to is to ask an applicant to name the various colors on the billboards within view of the office windows. To have more than one

method of testing for color blindness is essential to good practice.

MENTALITY

The degree of alertness and quickness of perception is tested by requiring an applicant to call out the positions of signal arms. Samples of these signal charts are shown in one of the illustrations. The small line of signals is used in testing motormen and gives them the appearance of a standard semaphore as seen in daylight one mile away and against a clear sky. The three larger two-arm signals, shown on another chart, are employed in testing quickness of perception. The chart is placed in the test rack, and the light is flashed for two seconds on one mast at a time. The applicant, after this two-second interval of observation, must describe the position of the two arms.

It is difficult to test for and grade degrees of mentality. The time during which an applicant is under observation is short, consequently when he is slow in comprehending directions or answering questions, he must be subjected to more rigid tests. Men who are inclined to be fresh, forward and talkative are rejected. Applicants who act peculiarly or are nervous or excitable are also examined carefully. Any applicant with an impediment of speech is rejected, as distinct enunciation, when the names of streets or stations are being called, is considered important.

PERSONAL APPEARANCE

Another point which should be considered in the examination of applicants is the personal appearance of the prospective employees. This applies particularly to the condition of the skin on the face and hands. No applicant with a contagious skin disease or disfigurement of the face should be appointed to a position where he comes into contact with the public. The carriage and poise of the applicant should also be noted. An upright, straight-backed man who avoids a slouching attitude is preferable to one who is not particular about his personal appearance.

Every transportation company should have a regularly appointed medical examiner who is a licensed physician. This work is too important to be left to some employee who gives a few insignificant tests. Complete equipment for conducting examinations is invaluable and soon pays for itself. It is always good practice to require a complete written report of every examination, as well as to employ only physicians who will give painstaking attention to their work.

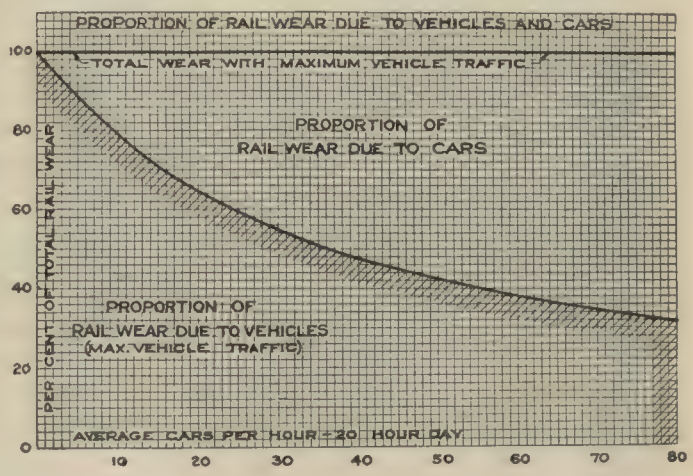
The standard of employees on the Elevated Railroads of Chicago is not exceeded anywhere in transportation circles. Strict requirements are not resented by any man. When an applicant finds that he must submit to a rigid examination which he passes successfully, he knows that he is in a superior class on account of his good physical condition. A fact that attests to the fine physical condition of the elevated railroad employees is that 70 per cent of them carry life insurance. Summed up, the essential qualifications of employees in transportation work are normal sight, normal hearing, perfect color perception, normal mentality and pleasing personal appearance.

In compliance with the request of the Austrian Minister of the Interior, the Vienna Tramway has had printed on the backs of all tramway tickets culinary advice as to how to cook economically in view of possible famine. The recipes are meant for the middle and poorer classes, who are unable to obtain flour, butter and eggs, and have to content themselves with dried fish, potatoes and rice.

Rail Wear in Chicago

Amounts Due to Vehicles and Cars—Notes on Paving, Ties and Electric Welding

Some interesting technical data on rail wear in Chicago are presented in the sixth annual report of the Board of Supervising Engineers Chicago Traction. The report says that it is the general impression that vehicle traffic causes but very slight wear on a railway track when it is properly built, but recent observation made on a section of unused track laid with a standard concrete base seems to contradict this conclusion. This section of track had never been used by cars since it was laid owing to the objections of abutting property owners, so that all of the wear upon it had come from vehicles. Careful measurements made with Vernier instruments after this track had been in the street for forty months showed that approximately 1/32 in. reduction had occurred in the rail head, measured on the center line of the tread. This represents 5 per cent of the wearing life of the original section of the rail. As the tread was perceptibly coned, the maximum wear was greater than that shown by these measurements.



RELATIVE PROPORTIONS OF RAIL WEAR DUE TO VEHICLES AND TO CARS ON STREETS OF MAXIMUM VEHICLE TRAFFIC IN CHICAGO

These results are corroborated by the fact that the lip of old girder rail had been worn down and bent over elsewhere in the city by team traffic, and in some cases the flangeway of standard 129-lb. rail has been considerably enlarged by the wear of wagon wheels, thus materially reducing the wearing width of the rail tread.

To determine the extent to which vehicle traffic is responsible for the wear of rails, a large number of observations were made at different points of the system. The results are thoroughly consistent and are shown in the accompanying diagram, in which the relative portions of wear from cars and vehicles are shown for varying average headway of cars along the street. This diagram shows that even on a line with a great deal of railway traffic, such as forty cars per hour for a twenty-four-hour day, vehicle wear may amount to as much as half of the total wear on the rail head, thus reducing the life of the rail by a corresponding amount. Other measurements, taken on short sections of track laid along the edge of Lincoln Park, where the rail was not subject to any vehicle wear but carried a large car traffic, showed a wear no greater than that on Cottage Grove Avenue and on Madison Street, with only half the car traffic but with heavy team traffic.

Elsewhere in the chapter on track the report says that study is being given to the development of an improved rail fastening so that the full advantages of

steel ties may be realized and also to the development of reinforced concrete ties with a suitable fastening. This is being done because of the rapid deterioration of wood ties, due to the seepage of moisture through the pavements, especially where frequent sprinkling of the track is practised.

As a result of rolling the subgrade and the use of a concrete foundation with tie plates, the settlement of the track structure has been reduced to an inconsiderable amount. However, the use of the usual sand cushion under granite block paving has proved unsatisfactory, particularly for pavement adjacent to the rails. Consequently, paving blocks, adjacent to the rails, are now being set in a cement mortar, applied either dry or wet. This simple expedient has practically done away with the settling of pavement along the rails.

The report also refers to the method of making track repairs by electric welding. Current is taken from the trolley wire through a resistance, and tool or alloy steel is deposited at defective points by means of the electric arc. Up to this time the attempt to repair defects in solid manganese special work has met with only indifferent success, presumably owing to lack of definite knowledge as to the metallurgical process involved. But on rails the plan has been successful. Cupped joints have been built up level, hammered special work has been resurfaced, flangeways have been built up so as to renew flange-bearing special work, broken intersections have been saved until the renewal is made of the whole layout, loose sections have been welded in place, and numerous other applications of extra metal have been made to lengthen the life of the track structure.

Brooklyn Safety Reports for Employees

Many Safety Suggestions Made by Employees—Table of Costs of Safety Installations

The third quarterly safety report of the mechanical department, Brooklyn Rapid Transit System, covering the quarter year ending March 31, 1915, shows a praiseworthy decrease compared with the preceding three months. The interest of the rank and file in the work is shown by the many safety suggestions which are made by them.

The first part of the report contains a plea for co-operative interest on the part of the employees, without which the efforts of the company in safeguarding the machinery and making other improvements will be of little value. There is a quotation also from the report of the National Safety Council in Chicago, stating that, as a result of an investigation made of 8000 accidents, the following were found to be the four principal causes: (a) Men falling from high places, (b) men dropping heavy parts, (c) things falling on men, (d) handling tools. Protective devices could have prevented very few of these accidents, the responsibility was entirely on the man on the job.

One feature of the quarterly reports of the company is to give a list of the safety suggestions received at the different regular meetings of the safety committee held every two weeks, and also the action taken. The following are some of the suggestions contained in the second quarterly report, and will give an idea of the kind of suggestions received:

Fig. 1—Never use a broken ladder; it always slips—sometimes without giving you the chance to catch hold. Fig. 2—Never use a broken box or barrel to stand on; it is time well spent to get the proper horse or ladder. Fig. 3—Do not remove the support from under a scaffold and try to catch the plank; always climb up and carry it down. Fig. 4—The safe way to cross a pit.

CAUTION PICTURES USED IN THE SAFETY WORK OF THE MECHANICAL DEPARTMENT, BROOKLYN RAPID TRANSIT SYSTEM

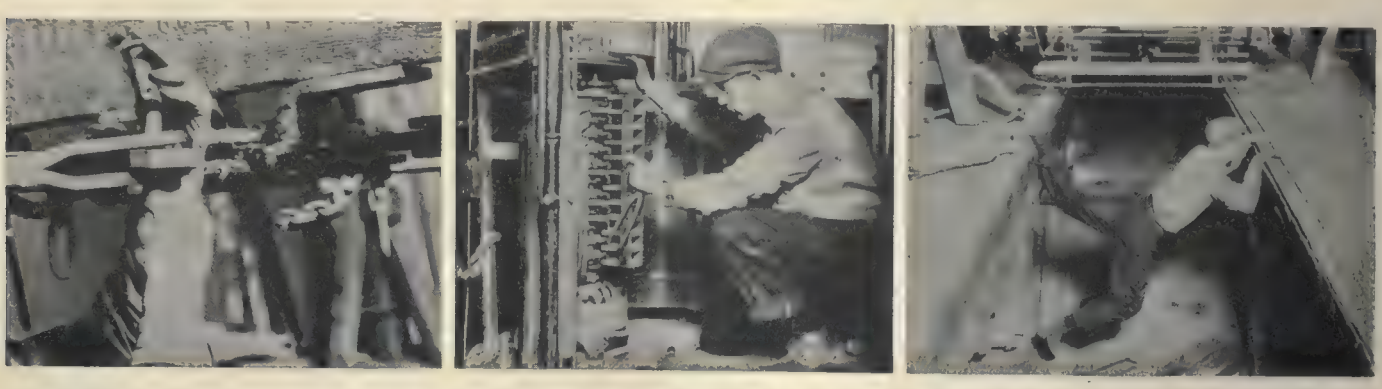


Fig. 5—Always use a drift pin in lining up the various members. Fig. 6—Is the pole off the wire? Fig. 7—Never attempt to jump across a pit.

CAUTION PICTURES USED IN THE SAFETY WORK OF THE MECHANICAL DEPARTMENT, BROOKLYN RAPID TRANSIT SYSTEM

SAFETY SUGGESTIONS RECEIVED

Suggestions	Made by	Action Taken
Purchase special jacks for removal of air compressors.	Departmental safety committee.	Adopted
Paint red those equipment parts on snow sweepers that might under certain conditions be the cause of accidents.	P. S. Scott.	Adopted
Stop all cars operating on a track where other cars are jacked up a full car-length from the jacked-up cars.	W. S. Sutton.	Adopted
Install iron hooks or racks at all shops to hold spare trolley poles.	M. F. Hutt and departmental safety committee.	Adopted
Install troughs or similar protection under longitudinal belts over benches.	Bernhard Glinski, Fifty-second Street Shop.	Adopted
Cover open end of planers.	Departmental safety committee.	Adopted
Remove nails from top of kegs used by storeroom in shipping supplies.	E. Newmeyer, Crosstown surface carhouse shop.	Referred to purchasing dept.
Fit chains used for lifting wheels and axles with rings on both ends; rings to be slipped over journals.	P. Rolleni, East New York surface carhouse shop.	Adopted
Order "respirators" for men employed in blowing out motor controllers and similar work.	F. N. Smith, Canarsie Surface Carhouse Shop.	Under consideration
Use round cutting heads on jointers and planers.	Departmental safety committee.	Adopted
Place caution and danger signs at certain points around transfer tables and elevator doors leading onto tracks, etc.	Departmental safety committee.	Under consideration

A list of safety work under way or completed, and its cost, also from the second quarterly report, follows:

Description	Completed or Under Way	Cost
Construction and installation of mail boxes for safety suggestions, and frames for pictorial matter at all shops.	Dec. 8, 1914.	$85.96
Installing safeguards around machinery at Fifty-second Street surface shop.	Under way.	736.81 Est.
Purchase of four hydraulic jacks for use at DeKalb Avenue surface carhouse shop.	Under way.	460.00 Est.
Safeguarding machinery at surface carhouse shops.	Under way.	1074.73 Est.
Safeguarding machinery at Fresh Pond repair shop.	Under way.	324.50 Est.
Purchase and place in use steel jack-up beams for supporting cars at surface carhouse shops.	Under way.	502.18 Est.
Installing gates at elevator well at Fifty-second Street shop.	By way and structure department.	127.00 Est.

The following table shows the total number of accidents which have occurred in the shops of the company during the past three quarters:

Class	Injuries	For three months ended Oct. 1, 1914	Jan. 1, 1915	April 1, 1915
A	Cuts	152	94	71
B	Burns	17	10	10
C	Bruises	85	44	37
D	Bones broken	1	3	1
E	Sprains and strains	14	12	5
F	Electric shocks	2	1	2
G	Foot punctures	6	1	4
H	Nails torn off	4	2	4
J	Eye injured	9	10	8
K	Loss of member	1	0	1
L	Internal	2	1	3
	Totals	293	178	146

These reports are put in the hands of every shop man on the system. Besides the text, each report contains a group of views. The views in the report for the quarter ended April 1 show different types of safety guards used on shop machinery. Those for the previous quarter were of common causes of accidents. The latter are reproduced herewith.

In the description of the test of the arc welded joint, described by E. C. Price of the Indianapolis Switch & Frog Company on page 1156 of the last issue of this paper, the pressure to which the joint was subjected should have read 300,000 lb. instead of 30,000 lb.

Jitneys at San Antonio

Jitney operation at San Antonio, Tex., began about the middle of January. Observations made by the San Antonio Traction Company on March 16 showed that there were then in service 154 jitneys, which carried 11,991 passengers on 7103 trips, or but 1.69 passengers per trip. The average revenue per car therefore was $3.89. A second count, made on April 15, showed 182 cars in service, carrying 11,981 passengers on 7775 trips, or 1.54 passengers per trip. This reduced the average revenue per car to $3.29. A later count, made on May 7, showed that the number of cars had increased to 201, but as the trips and passengers respectively had risen only to 8093 and 12,559, the average gross earnings per car decreased to $3.14.

A peculiar characteristic of the jitney business at San Antonio is that the cars do not display route signs until they have picked up a passenger, who indicates his destination. Upon this they put up a sign in addition to the regular 5-cent symbol. The cars also do a great deal of sniping from taxicabs, and in the late afternoons they desert the business district to take the baseball fans home.

Although the jitneys generally operate over paved streets within a 2-mile zone they have failed to make a good living for their operators despite no allowances for depreciation and amortization. As in other cities, more than one-half of the jitney operators have dropped out after becoming acquainted with the harsh facts of tire renewal and general repairs. Nevertheless, the gaps in the jitney ranks have been quickly filled by others who, as the foregoing figures show, are earning less than their predecessors.

An ordinance to regulate jitney operation at San Antonio has been passed by the Council but is now under review by the Court of Criminal Appeals on application of the local Auto Service Association. This ordinance calls for operation over specific routes; a license fee of $25; a bond which would call for a maximum payment of $5,000 to one injured passenger and $10,000 to all passengers injured on a given trip; definite stops in the central district; provision against riding on running boards or fenders, etc. The ordinance was passed on March 8 and was to have become effective on April 1.

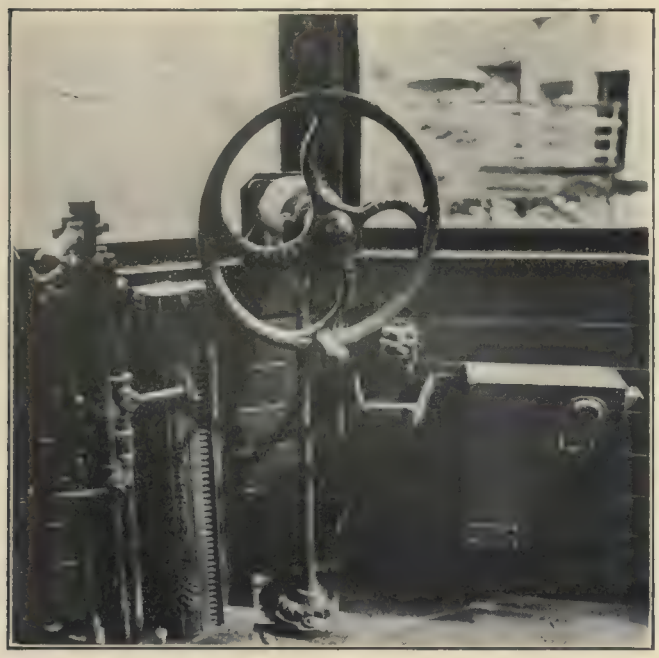
An Enviable Safety Record

Although it was making a perfect record in the matter of avoiding accidents, the St. Louis (Mo.) Electric Terminal Railway only recently had occasion to check up the results of its safety movement. The St. Louis Electric Terminal Railway operates a 7½-mile line between St. Louis and the Tri-Cities, namely, Venice, Madison and Granite City, Ill. Regular service includes 114 trips daily, during which an average of 9000 passengers are transported in the week days and 14,000 on Sundays. This line has now been in operation four and one-half years, and there has not been a single fatal accident in connection with the local surface or the through interurban cars of the Illinois Traction System, which also operates over this section of track. During the period approximately 238,000 car trips were made and 17,000,000 passengers carried. By making the safety-first movement a part of its every-day business in training employees and operating trains, the 100 per cent record of efficiency was obtained. In explanation of this record E. D. Bell, general superintendent, states that until he was requested by the head of the safety department for statistics regarding accidents, he was unaware of the unusual record of operation which has obtained since this line began regular service.

Coasting Records of Northern Texas Traction Company

This Company Operates Coasting Recorders on Thirty Interurban and 153 City Cars—The Average Coasting on the Interurban Lines Is Now 38.2 Per Cent and 33.2 Per Cent on the City Lines—The Cost of Energy Has Been Decreased with the Increase in Coasting

About the middle of 1911 the Northern Texas Traction Company installed for trial twenty-three Rico coasting recorders which were placed partly on interurban cars operating between Fort Worth and Dallas and partly on city cars in Fort Worth. No special follow-up organization was formed at that time, but the men were advised of the purpose of the clocks and how to take readings. A representative of the Railway Improvement Company, however, spent some time among the men to show them how to coast efficiently. These pioneer efforts did not meet with the desired success, owing partly to defects in the recorders, since corrected, and partly to lack of understanding by the trainmen. Furthermore, the following up of the work was hindered by a lack of appreciation, even by the company officials, of the real possibilities of this device.



NORTHERN TEXAS COASTING—RECORDER INSTALLED NEAR THE FLOOR IN DALLAS INTERURBAN CAR

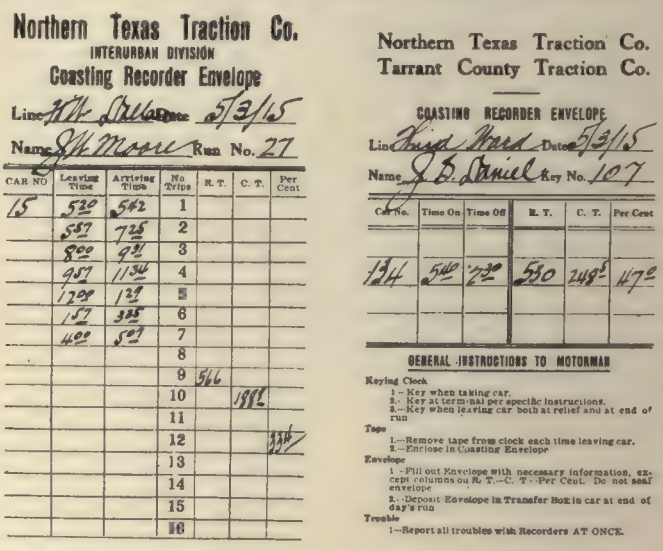
In April, 1914, following a conference between representatives of the manufacturer and the railway, the old recorders were replaced by improved ones, which were not installed on the first interurban cars but were used in such manner as to equip completely the Hemphill city line and all the cars of the Cleburne interurban line of the Tarrant County Traction Company, an affiliated property. This gave the desired opportunity to make a thorough test and a comparison against previous conditions.

For six weeks preceding the use of the recorders, the individual lines were metered for energy-consumption records. During this time nothing was said to the motormen. Following that period, however, the men were instructed mutually by the manufacturer and the railway, both at general lectures and individually on the cars.

During the first six weeks following the introduction of the recorders, the Cleburne interurban line showed coasting amounting to 22.4 per cent, and the Hemphill city line, 29.6 per cent. This test showed that the ratio of increased coasting to decreased energy use was 1:1.06 on the city line and 1:1.2 on the interurban line. Since that time the coasting percentages have increased to 38.2 per cent and 34.2 per cent respectively, but the ratio of increased energy saving to increased coasting is somewhat less. During the same test period the reduction in brakeshoe costs was 38 per cent on the city line, but no record was kept of possible brakeshoe savings on the interurban line.

Results of Later Tests—Coasting Department

As a consequence of the satisfactory operation of the recorders on the two trial lines named, the railway installed, beginning March, 1915, 160 additional instruments, making a total of 183. To handle the records properly and to maintain a follow-up system the railway organized a "coasting department," the personnel of which calls only for a superintendent and one clerk. This permits the department to be operated for a total labor, maintenance and stationery expense equivalent to



Northern Texas Traction Co.
INTERURBAN DIVISION
Coasting Recorder Envelope
Line Ft. Worth Date 5/3/15
Name J. H. Moore Run No. 27

CAR NO	Leaving Time	Arriving Time	No. Trips	R. T.	C. T.	Per Cent
15	520	542	1			
	557	725	2			
	800	921	3			
	957	1134	4			
	1209	123	5			
	157	335	6			
	400	507	7			
			8			
			9	566		
			10		1892	
			11			
			12			33%
			13			
			14			
			15			
			16			

Northern Texas Traction Co.
Tarrant County Traction Co.
COASTING RECORDER ENVELOPE
Line Fwd Ward Date 5/3/15
Name J. B. Daniel Key No. 107

Car No.	Time On	Time Off	R. T.	C. T.	Per Cent
134	540	722	530	248	47%

GENERAL INSTRUCTIONS TO MOTORMAN

Keying Clock
1.—Key when taking car.
2.—Key at terminal per specific instructions.
3.—Key when leaving car both at relief and at end of run

Tape
1.—Remove tape from clock each time leaving car.
2.—Enclose in Coasting Envelope

Envelope
1.—Fill out Envelope with necessary information, except columns on R. T.—C. T.—Per Cent. Do not seal envelope
2.—Deposit Envelope in Transfer Box in car at end of day's run

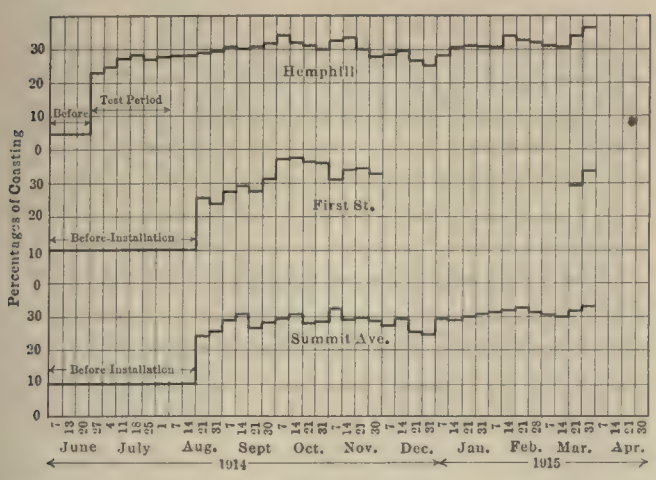
Trouble
1.—Report all troubles with Recorders AT ONCE.

NORTHERN TEXAS COASTING—ENVELOPES USED FOR MOTORMEN'S TAPE RECORDS

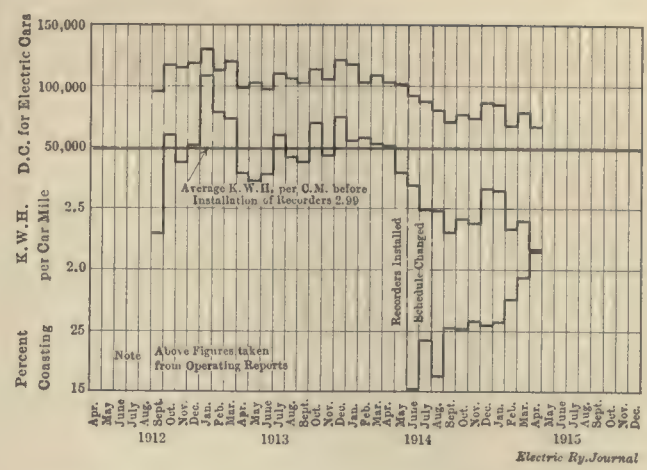
about 8 per cent of what the recorders now save. It is expected, that with increased experience the ratio will be decreased.

Method of Record Keeping

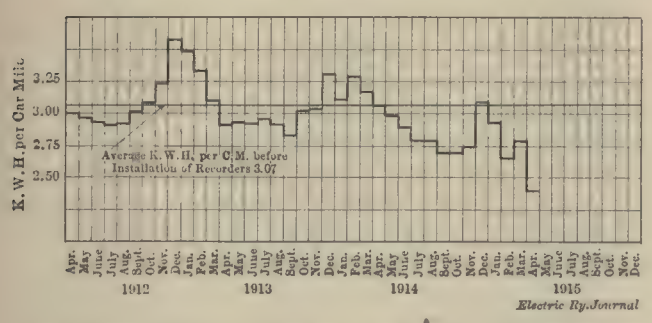
The record made by the recorder is of the Rico standard tape form. The tape is placed by the motorman in envelopes of the types reproduced, one form being used for city and the other for interurban service. The city envelopes are deposited in the conductor's transfer box, while the interurban envelopes are placed in a box at the dispatcher's office. The tape records, on reaching the coasting department, are figured for the proportion of coasting time to running time and entered for a full-



NORTHERN TEXAS COASTING—COASTING PERCENTAGES BY WEEKS



NORTHERN TEXAS COASTING—ENERGY CONSUMPTION DATA ON TARRANT COUNTY LINES



NORTHERN TEXAS COASTING—ENERGY CONSUMPTION DATA ON NORTHERN TEXAS LINES

day basis on a form designed to take care of a man's performance for a full year. The original tapes are kept on file only one week or ten days, which is sufficient to give a doubting motorman a chance to check the published statements of the department.

Comparisons of the men are posted on weekly and monthly bulletins, each line being shown separately in order to avoid unjust comparisons. The absolute average of each line is also placed at the bottom of the list.

On some lines the men are subdivided according to regular, extra and express. Men of the first class make the best passenger car records owing to their greater familiarity with the conditions on the line, the maximum for a given week ranging from 43.7 per cent to 39.8 per cent. Still better records, a maximum of 45.1 per cent, have been obtained by the operators of the express-baggage cars because of fewer stops and other more favorable running conditions. The extras work only about 5 per cent of the time so that their lower records do not materially affect the general averages.

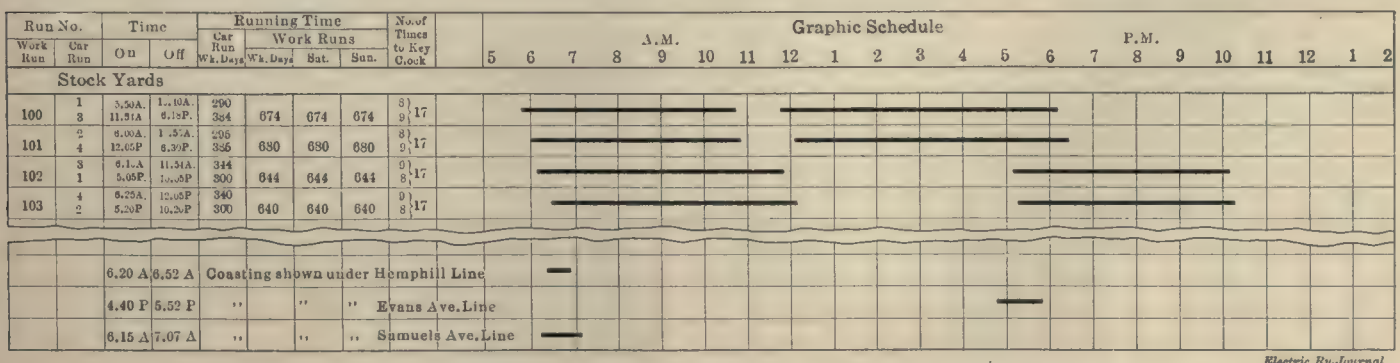
Still another kind of subdivision is in vogue on the Fort Worth-Dallas interurban line, where the men are divided according to limited runs, day local runs, night local runs, express runs and miscellaneous runs made by extra men. In comparing the records in these subdivisions it should be noted that the limited runs which might be expected to have the highest coasting do not lead in this respect because the schedule speeds are so much greater (26.3 per cent) than on other runs. However, even with the high schedule speed of 42 m.p.h. on the strictly interurban section of 26.5 miles, coasting has been as high as 28.1 per cent over a one-week period. City men, it may be added, are subdivided according to regulars and extras. The comparisons of extra men are made regardless of the lines to which they may be assigned.

SPECIAL RECORDS

Several interesting records have been derived from the coasting figures as hereinafter described. In one of the accompanying line cuts is shown a set of graphs covering operations on several city lines, from which it appears that the coasting percentage on the Hemphill line was raised from 5 per cent before the installation of recorders to a maximum of 36.7 per cent after the recorders had been in use thirty-eight weeks, on the First Street line from 10 per cent to 37.7 per cent after eight weeks, and on Summit Avenue from 10 per cent to 33.2 per cent after twenty-nine weeks.

Another graph shows the d.c. kilowatt-hours per car-mile consumed for all services of the Northern Texas Traction Company from 1912 to April, 1915. The recorder operations during the first two years were not important enough to have any bearing on the energy consumption. This graph shows a reduction from 3 kw-hr. per car-mile in April, 1914, to 2.4 kw-hr. in April, 1915.

A similar record of the Tarrant County Traction Company's cars shows a reduction from 2.99 kw-hr. per car-mile to 2.15 kw-hr. The schedule change referred to in no way effected any alteration in schedule speed,



Run No. Work Run	Run No. Car Run	Time On	Time Off	Running Time Car Run Wk. Days	Running Time Work Runs Wk. Days	Running Time Work Runs Sat.	Running Time Work Runs Sun.	No. of Times to Key Clock
Stock Yards								
100	1	5.50A.	1.10A.	290				8
	3	11.51A	6.12P.	384	674	674	674	9 } 17
101	2	6.00A.	1.35A.	295				8
	4	12.05P	6.30P.	385	680	680	680	9 } 17
102	3	6.1.A	11.51A.	344				9
	1	5.05P.	10.55P	300	644	644	644	8 } 17
103	4	6.25A.	12.05P	340				9
	2	5.20P	10.25P	300	640	640	640	8 } 17
		6.20 A	6.52 A	Coasting shown under Hemphill Line				
		4.40 P	5.52 P	"	"	"	Evans Ave. Line	
		6.15 A	7.07 A	"	"	"	Samuels Ave. Line	

NORTHERN TEXAS COASTING—GRAPHIC SCHEDULE FOR CHECKING RUNNING TIME

as it was purely an elimination of layovers which permitted three cars to do the work of four. It may be emphasized here that all schedule speeds with the recorders in use are exactly the same as they were before their installation.

On page 1199 is reproduced a chart showing a graphic schedule as prepared for individual lines. The purpose of this chart is to give a picture of each car's performance throughout the day so that the running time of the cars can readily be checked against the running times shown on the tape-holding envelopes turned in by the motormen. The record is made up as follows: The first column gives the motorman's work run number; the second column gives the car runs which make up the work run number, the number of the car run referring to the order in which the cars leave the carhouse; the third and fourth columns show the on and off time with each car; the fifth column shows the running time, in minutes, of the different car runs; the sixth, seventh and eighth columns show the running time, in minutes of work runs for week days, Saturdays and Sundays; the ninth column shows the number of times the recorder should be keyed, this record serving as a check on the correct number of recorder punchings; the remainder of the form is a straight line graph which shows the periods of time that the car is on work runs. A similar record is made for interurban service except that the graphic section is made to show the layovers at each terminal.

Northern Texas Traction Company and Tarrant County Traction Company—Tabulation of Troubles with "Rico" Coasting Time Recorders

Name of Part Developing Trouble	For Month of July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
Clock Mechanism:										
1. Main spring	..	..	..	..	..	..	..	..	..	..
2. Release spring	1	..	..	..	..	..	..	..	..	..
3. Balance wheel	..	..	1	..	2	1	..	..	..	..
4. Escapement	..	..	..	..	1	..	..	..	..	3
5. Jewel bearings	..	..	..	..	2	..	..	..	..	..
6. Hair spring	..	..	..	..	2	2	..	..	1	..
7. Other wheels, gears, etc.	2	..	..	1	..	..	..	..	..	..
8. Armature	..	..	1	..	..	..	..	..	..	3
9. Magnets	..	..	1	..	..	..	..	..	..	..
10. Terminals	..	..	..	..	..	..	..	..	..	..
11. Dirty mechanism	..	..	..	..	..	..	..	..	..	..
12. Miscellaneous	1	..	..	..	..	..	..	..	..	1
Total	4	0	3	1	7	3	0	0	1	7
Printing Mechanism and Case:										
1. Ribbon	5	..	1	..	..	1	3	1	1	..
2. Impression hammer	..	..	..	..	..	..	..	..	..	..
3. Tape chute	..	..	..	..	..	..	..	..	..	..
4. Key mechanism	..	..	..	..	..	..	..	..	..	..
5. Type wheel	..	..	..	..	..	..	..	..	..	..
6. Other wheels, gears, etc.	..	4	..	..	..	..	..	..	..	..
7. Dirty mechanism	..	..	..	..	..	..	..	..	..	..
*8. Paper stuck	7	10	7	9	2	5	2	3	..	14
9. Lock	..	..	1	..	..	..	..	..	..	..
10. Case	1	..	..	..	..	..	..	..	1	..
11. Miscellaneous	1	..	..	..	..	..	..	..	..	1
Total	14	14	9	9	2	6	5	4	2	15
Relay, Wiring and Contact Box:										
1. Armature	..	..	..	..	..	..	..	..	..	..
2. Magnet	..	..	..	..	..	..	..	..	..	1
3. Air cylinder	..	..	..	..	..	..	..	..	..	..
4. Air connections	..	..	..	..	..	..	..	..	..	..
5. Piston	..	..	..	..	..	..	..	..	..	..
6. Release spring	..	..	..	..	..	..	..	..	..	..
7. Contact arm	1	..	..	..	..	..	..	..	..	1
8. Contact plate	..	..	..	1	..	..	..	..	..	..
9. Blowout coil	..	..	..	..	..	1	..	..	1	..
10. Terminal connections	..	..	..	..	..	..	..	..	..	..
11. Resistance tubes	1	..	..	..	..	..	..	..	..	..
†12. Fuse	19	12	3	3	4	6	1	5	4	22
13. Controller connections	..	..	..	..	..	..	..	..	..	..
14. Car wiring	..	..	..	..	..	..	..	..	..	..
15. Miscellaneous	..	..	..	..	1	..	..	..	..	1
16. Hand-brake contact box	..	..	..	..	..	1	..	..	4	37
17. Miscellaneous	..	..	..	..	2	..	..	2	..	.
Total	21	12	3	4	7	8	1	7	9	62
Grand totals	39	26	15	14	16	17	6	11	12	84
Average number troubles per car per month	1.70	1.13	0.65	0.61	0.69	0.74	0.26	0.47	0.16	0.46

*Paper sticking due to motormen tearing off improperly.
†Fuse blown due to reversing car.

Checking Bad Records

In case a car has been making appreciably less coasting than customary, the mechanical department is asked to make an examination of the equipment. One occasional source of trouble thus uncovered has been traced to poor brush contact on the traction motor which acts as a generator during the coasting period in order to operate the recorder. Therefore, if there is poor contact the recorder will not operate during the full coasting period. This defect, of course, is readily corrected. Tight brakes and low bearings have also been found to cause low registration. The fact that the recorder helps to reveal defective equipment is, of course, another point in its favor.

Maintenance of Recorders

The recorders are maintained in the mechanical department by the same man who handles register repairs. These instruments, however, have given very little trouble as will be seen from the tabulation of defects reproduced in the accompanying table. It may be worth noting that the thirty-seven cases in April of hand-brake contact-box trouble were due to unusually heavy rains. These rains caused the swelling of the fiber through which the plunger of the contact box passes, thereby causing the plunger to stick. This has been remedied by reaming out the hole in the fiber to make ample allowance for swelling in future. The principal cases of fuse blowing are due largely to emergency reversals, thus providing a check on the motormen in this respect as well. The troubles with paper stuck are due to careless tearing off of tape.

Maintaining Interest in Coasting Performance

Interest in the coasting recorders is maintained chiefly by posting the individual performance records at each car station. However, when a man has an unusually low record the inspector in charge of this man's division rides with him to determine and correct his operating methods. The superintendent of the coasting department also rides with such delinquents occasionally, to point out the advantages of good coasting from the standpoints of comfort and safety to the passenger and less energy consumption and decreased car maintenance for the company.

European Sand for New York Subway

Sand imported from Europe is being used in construction of the new subways in New York City. This is not because suitable sand cannot be obtained in this country, but because the war in Europe has cut down the cargoes which steamships ordinarily bring from the other side of the Atlantic to such an extent that it is necessary for many ships to come over in ballast, for which beach sand has been used. Upon arriving in New York this ballast is discharged to make room for the returning cargoes and is practically given away by the steamship company to anyone who will haul it away and dispose of it. Rodgers & Hagerty, Inc., who have the contract for the construction of Section No. 15 of the Lexington Avenue subway, extending from about 138th Street and Park Avenue through Mott Avenue and Franz Sigel Park and River Avenue to 157th Street, have used ten scowloads of this sand in back-filling what remains of the subway excavation.

C. E. R. A. Meeting

Details of the Non-technical Features of the Boat Trip and An Abstract of W. L. Allen's Paper on Railway Motor Gearing Are Given

An account of the trip of the Central Electric Railway Association from Cleveland to Buffalo on June 17 was published in the last issue of this paper.

Upon arrival at Buffalo the association and guests disembarked and were taken in four special cars furnished by the International Railway to Niagara Falls. After viewing the American falls special cars again took the party to the Canadian falls where, after a short time, the trip through the Niagara Gorge Route was begun. The cars stopped at all points of interest, and luncheon was served en route. At the Whirlpool Rapids a brief stop was made and the entire party assembled for a photograph. The special cars returned to Buffalo from this point, arriving at the boat landing about 5 o'clock. During Friday evening the association was entertained with music, by a full orchestra, and dancing. During the progress of the evening twenty prizes for the ladies were distributed by lottery. The method of giving these prizes was especially pleasing since, unlike the card games, all ladies had an equal chance to receive one.

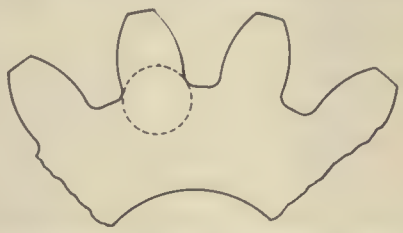
The trip was voted by all who participated in it a great success and as reflecting great credit on the enterprising and capable committee in charge.

RAILWAY MOTOR GEARING

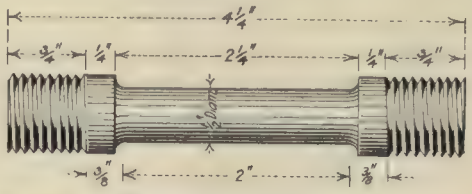
BY W. L. ALLEN, COMMERCIAL ENGINEER, R. D. NUTTALL COMPANY

Gearing is subjected to very severe stresses and wear. Its first cost and the cost of installation are such as to make economical purchase possible only through the correct selection of the grade of material for the specific service. Both the manufacturer and the operator have come to realize that such operating conditions as horsepower of the motor, gear ratio, lubrication, bearing maintenance, number of stops per mile, and topography of the country are the controlling factors in determining the life of any given grade of material. As the possible variation in these conditions is largely dependent upon the service that must be rendered and the facilities for car maintenance, the operator is forced to vary the grade of gearing to suit these conditions rather than to rearrange his operating conditions to suit any given grade of gearing.

The progressive operator is compelled to give serious consideration to plans for determining the relative merits of the various grades of material in his specific service. The larger properties maintain test departments, making service tests of each new grade offered, while the smaller properties conduct similar tests on a less elaborate scale or are governed by the results of tests made on other properties. Service tests are absolutely necessary to determine adaptability to a given service, but a great many operators have found that the indiscriminate testing of new materials is troublesome, costly and greatly retards the adoption of standards for their service. The necessity for more intelligent testing has led the operator to cast about for some method of comparing each new grade offered with materials used in the past and determining the possibilities of these new grades to solve his breakage and mileage problems. The American Electric Railway Engineering Association has endeavored to classify the respective grades of materials according to their physical characteristics.



RAILWAY MOTOR GEARING—REGION FROM WHICH TEST PIECE SHOULD BE TAKEN



RAILWAY MOTOR GEARING—DIMENSIONS OF STANDARD TEST PIECE

The stresses to which gearing is subjected are of two kinds; those produced by the normal static load due to transmission of power, and those occurring from the dynamic load due to the impact of starting and stop-

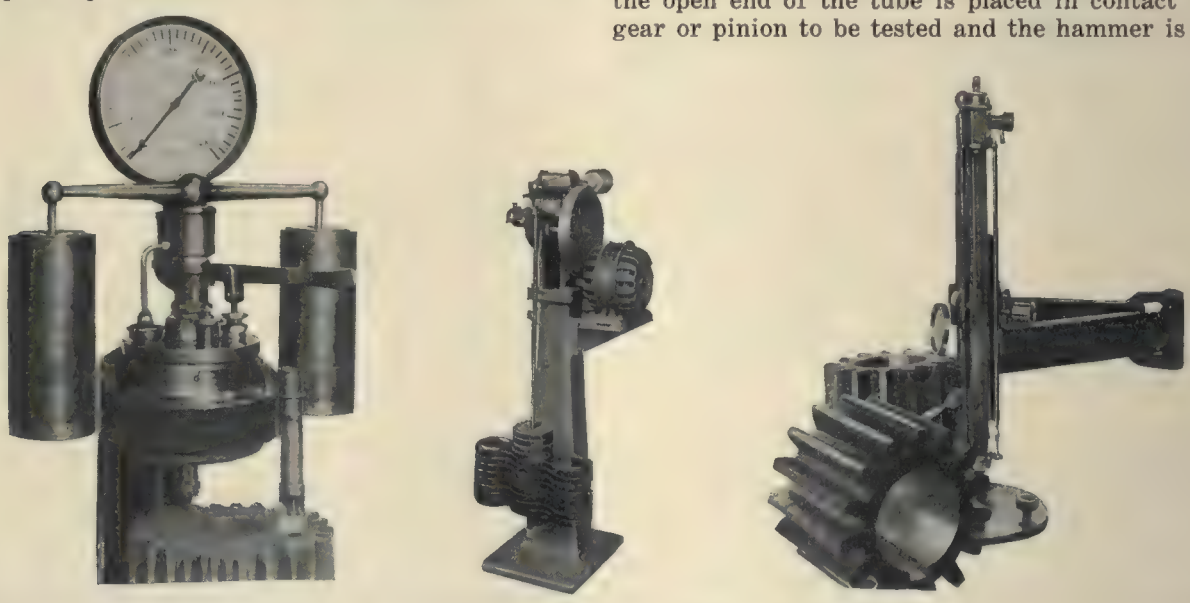
RAILWAY MOTOR GEARING—TEST PIECE UNDERGOING TENSION TEST, AND GROUP OF TESTING MACHINES IN LABORATORY

ping. The resistance to static load is dependent upon the strength of the material, while the resistance to dynamic load depends upon toughness as well as strength.

As the load which is applied to gear and pinion teeth tends to break them out at the root, the quality of the material at that point should be determined. This may be accomplished by ascertaining the "ultimate tensile strength," the "yield point," the "elongation" and the "reduction of area."

RAILWAY MOTOR GEARING—TEST PIECE BEFORE STRETCHING, AFTER PASSING ELASTIC LIMIT, AND AFTER FAILURE

In testing, a standard test piece is machined from the gear or pinion at the base of a tooth, as shown herewith. Both ends are threaded and the center for two inches of its length is machined to a smaller diameter. The threaded ends are screwed into the grips of the testing machine, one grip being part of a beam scale, while a load is applied to the other grip sufficient to pull the test piece apart.



RAILWAY MOTOR GEARING—BRINELL MACHINE, MACHINE FOR TESTING RESISTANCE TO ABRASION, AND SCLERESCOPE

As the load or force is applied the test piece will elongate proportionally until the "yield point" of the steel is reached, after which the rate of elongation is materially increased.

The tension necessary to bring about this change in the rate of elongation may be observed on the beam of the scales, and may be expressed in pounds per square inch of the test piece. Similarly the load exerted to cause rupture, may be expressed as the "ultimate tensile strength" per square inch.

The elongation of the test piece is determined by making two center punch marks, usually two inches apart, upon it before subjecting it to tension and measuring the distance between these marks before and after testing. The elongation obtained in per cent of the original length is termed the "elongation in two inches," if that is the length used. Elongation of a test piece is always accompanied by a reduction in its cross-section at the point of rupture, and the amount of this reduction expressed in per cent of the original area is termed the "reduction of area."

The "yield point" and "ultimate tensile strength" represent the strength of the material, while the elongation and reduction of area indicate the toughness or ductility, and represent the resistance to fatigue, alternating stresses or dynamic blows.

Relative Life

Resistance to abrasion depends upon hardness and refinement of grain structure. Relative hardness may be determined by means of the Brinell machine or the sclerescope.

In the Brinell machine a hardened steel ball is pressed into the surface of the gear or pinion to be tested, at a pressure of 3000 kg (6615 lb.), and the impression then made is measured with a microscope. The dimensions of the impression forms the basis of calculation of the "Brinell hardness" and the approximate tensile strength at that point. This hardness is expressed in terms of a Brinell hardness numeral, for example, 600, which represents a glass-hard steel, or 150, which represents a soft steel. The Brinell test may be applied to gears and pinions without spoiling them.

The sclerescope is an instrument adapted to test surfaces where the Brinell machine cannot be used.

It consists of a glass tube, open at one end and having an air valve at the other end. In the tube is a diamond-pointed hammer. With the hammer at the closed end the open end of the tube is placed in contact with the gear or pinion to be tested and the hammer is released by means of the air valve, falling upon the piece under test. The relative hardness is indicated by the height of the rebound. This hardness is expressed in terms of a sclerescope hardness number, for example, 100 for a glass-hard steel and 30 for a soft steel.

There has been no commercial method devised for determination of relative grain structure. Microscopic analysis has not been adapted to anything but research work up to the present time. As two gears and pinions of similar physical characteristics at the root of the

tooth and at the surface may have different grain structures, it would seem advisable for the railway operator to observe the structure of the gearing under consideration by the breaking up of a gear or pinion, or by observing the grain structure of the test gear or pinion from which the test piece is machined.

It is quite possible to machine a test piece from oil-tempered and other heat-treated materials, but it is impracticable to test a case-hardened gear or pinion in this way on account of the dual characteristics of the material. In the testing of case-hardened gearing, however, the surface hardness can be determined by testing each gear or pinion with a sclerescope or Brinell machine, while the depth of "case" can be determined by breaking out a tooth and fracturing the broken piece to show the cross-section of the tooth. By grinding the broken surface and dipping in nitric acid the high carbon case will stand out black in contrast to the lighter-colored, low-carbon core.

One probable result of gear and pinion investigation by operators and the railway association gear committee will be the purchase of gearing to specifications. These specifications could be made to cover strength, toughness and surface hardness. However, as slight variation in chemical composition and heat treatment have decided effects upon physical characteristics it would be necessary for these specifications to set minimum limitations rather than definite values. This would provide a definite basis of comparison of various materials. While all might meet the specifications, their relative merits could be judged according to the extent to which they exceed the specified minimums. This method of purchase would have the effect of encouraging the manufacturer constantly to improve his material and justify any increase in first cost thus brought about. It would have the further advantage of eliminating confusion, on the part of the operator, in purchasing to trade names without complete knowledge of the characteristics of the material and would permit him to judge intelligently as to the ability of the respective materials to develop the maximum worth per dollar invested.

Investigating and Handling Automobile Accidents*

The Author Points Out the Practical Aspects of the Question and Urges Careful Preparation for Settlements

BY JOHN S. MILLS, ASSISTANT SUPERINTENDENT SAN FRANCISCO-OAKLAND TERMINAL RAILWAYS, OAKLAND, CAL.

While the greater number of automobile accidents result in damage to the vehicle only, the cost of repairs in the aggregate amounts to a considerable item in the claim accounts of every street railway company. The mental anguish of the owner is always a consideration. He has been hit in his tenderest spot—his pocketbook. When he calls on the claim agent the latter, if wise, will greet him pleasantly and treat him very much as he would an alarm clock by patiently waiting until he runs down. The claimant should be asked to put his claims in writing on a form provided for that purpose. Then, if the company's liability is not in doubt, repairs should be ordered promptly.

Nearly all companies repair their own automobiles at the car shops because it is cheaper than to have the work done by some outside concern. Obviously, then, it should be more economical to repair privately-owned automobiles damaged in collisions with cars at the company's shop. The foreman, or man in charge, is then available for the inspection of damaged automobiles taken to public garages for repairs. If he is provided with catalogs containing the prices of parts for the several makes of automobiles and has a good knowledge of the cost of labor he should be able to prepare good estimates to protect the company from overcharge.

If an experienced repairman is not employed by the company and repairs must be made in a public garage, it is well to select one in charge of a reliable and competent mechanic and divert as much work as possible to him. He will also be available for making estimates of the cost of repairing damaged automobiles which are taken to shops selected by owners. Such a man is worth many times his hire in the saving he can effect through his knowledge of prices, labor, etc., and the protection he can give from the common practice of including the cost of replacing worn-out parts in the list of damages.

Generally speaking, the inspection of damaged automobiles in the manner outlined would be the same where responsibility for the accident is undecided, as it would be if it was admitted by the claim agent. The only difference would be in the manner of dealing with the claimant.

In nearly all cases of doubtful liability the claimant either plays the part of the injured innocent who never before had an accident—is too careful to be at fault—has no desire to claim anything more than the cost of repairs, notwithstanding the loss of his valuable time; or, he blusters into the office, hints at law, lawyers and witnesses; balks at the request for a written account of the accident and finally runs down. Patience and a knowledge of human nature if properly exercised on either type will usually secure the desired statement, names of witnesses, etc. It should then be explained that it is impossible to decide the question of responsibility until the statements of disinterested witnesses are secured, but repairs to the automobile need not be delayed on that account. They can proceed and the payment of the bill by one or the other will be decided when the evidence is all in. It should be firmly impressed on the claimant that he must order repairs made on his own account, as the company cannot undertake to assume payment of the bill at that time. Inspection of the damaged vehicle should be ordered at once, but it is not advisable to send the company's representative to the shop with the owner or to inspect it in his presence. It may be the agency through which he bought the automobile, or he may be a regular customer of the repairman. In either case the man in charge will wish to please the owner and either refrain from having anything to say or encourage the owner to include in the list of damages repairs which were needed before the accident.

Dealers in second-hand automobile parts are now to be found in all large cities, and claim agents can effect a considerable reduction in claim costs by patronizing them.

Collisions of automobiles and railway cars causing injury to persons or serious damage to the vehicles involved demand thorough investigation, of which the securing of statements from witnesses is only a small part. Preparation for settlement or lawsuit should be equally thorough. If tests, diagrams, photographs, etc., are not made until attempts at settlement have failed or suit is filed, it may not be possible to secure them. Everything for completeness of detail depends upon the intelligence, coolness and observing qualities of the men comprising the crew.

Many lawsuits have had their inception in the testi-

*Abstract of paper presented at annual convention of Pacific Claim Agents' Association, San Francisco, June 24 to 26, 1915.

mony of trainmen at coroners' inquests. At these inquisitions witnesses are asked to state opinions as well as facts, and capable motormen will give estimates of time and distance that would be laughable were the consequences not so serious.

Whenever a serious accident occurs or, at least, whenever death results, the car should be inspected by the company's mechanic for possible defects, and as soon as circumstances will allow, an experiment should be made with it at the place of the accident, with the same crew and under substantially similar conditions.

It is presumed the men are well trained and have marked the exact spot where the vehicles collided, also where the motorman was when he first had reason to apprehend danger, and the places where both car and automobile stopped. The company's surveyor should measure distances and secure data with which to make a comprehensive diagram of the scene. One diagram should show fixtures only—such as tracks, curbing, poles and obstructions to the view when looking in either direction, for the benefit of the jury, if needed. The other should show the locations of the car and automobile at different stages of the accident, measurements of distances and other detail. This would be for the guidance of the employees who may be required as witnesses. They may say they can explain it on the ground but not on the diagram. That is just the point. They must learn to indicate the essential features on the diagram or they will likely make a mess of it if called to do so in court.

At the time the test is made, the distance from the point where the danger first became apparent to the motorman to the place of accident should be noted, and the test made with reference to such distance as well as with reference to the rate of speed. The estimated rate of speed at the time of the accident should be duplicated as nearly as may be, the car running in the same direction at the time of the experiment as at the time of the accident. The same means for avoiding the accident which the motorman claims to have used at the time of the accident should be employed in the test. If the result of the test does not support the opinion of the motorman with reference to speed and distance, then it is evident that he made an erroneous estimate of the rate of speed the car was making at the time he first saw the other vehicle in danger, or he made an equally poor estimate of the distance from the point of his first apprehension of danger to the place where the vehicles collided. Such an experiment will demonstrate a much nearer approximation of speed and distance than is likely to be obtained from the conductor or motorman without such a test.

In nearly every trial of a suit for damages resulting from the collision of an automobile and street car the questions of speed and distance are always uppermost. The last chance doctrine must be considered.

Of course, these experiments must be in charge of other experts than the car crew—usually the division superintendent and an inspector, who should make a joint report showing the result of the test. With this report and the surveyor's diagram as aids to a thorough understanding of the situation, the carmen should be reasoned with as to speed and distance and a complete account of all features of the accident should be recorded by a stenographer to enable the men not only to answer truthfully but intelligently all the questions which may be put to them on the stand.

As an illustration of the necessity for such a course, a motorman recently testified at a coroner's inquest in the case of a man run over by the car that when he first saw the deceased in danger, he was about 126 ft. from him, the car running at between 8 m.p.h. and 10 m.p.h.; that he immediately shut off the power, applied the emergency air and did all in his power to avoid the accident. That he finally brought the car to a stop after running 126 ft., over the man and 5 ft. beyond him, making 131 ft. in all. An actual demonstration made with the same car under the same circumstances, after the inquest, showed that at the rate of 10 m.p.h. the car was easily stopped within 26 ft. Had this motorman seen this experiment before he testified at the coroner's inquest he could not have made such a glaring mistake both as to speed and distance.

He testified upon the trial that he was mistaken in his testimony before the coroner's jury as to speed and distance, but upon cross-examination by opposing counsel was finally brought around substantially to his first statement at the inquest, with the result that a verdict was rendered in favor of the plaintiff to the amount of $15,000.

Collisions of automobiles and cars wherein passengers in the automobile are killed or injured present another phase of the subject for consideration.

Formerly there was considerable conflict in the authorities as to the law with regard to responsibility, but at the present time the law of this State is well settled that where the person injured is riding with another person upon a vehicle and has neither the control of nor the right to control the driving of the vehicle, the negligence of the driver of the vehicle contributing to the injury cannot be imputed to the person injured so as to constitute contributory negligence on his part, but the defense of contributory negligence must be sustained by proof of personal failure of the person injured to exercise ordinary care. It has also been held in this State that it cannot be said, as a matter of law, that the failure of the passenger to look to ascertain the position of the car or train before the vehicle turned across the track was contributory negligence.

The passenger has the right to assume that the driver of the vehicle is competent and that he should not put it in a perilous position. If the driver is an agent or employee of the person injured, then the negligence of the driver is imputable to the person injured. The passenger is also guilty of contributory negligence if the driver of the vehicle has been careless and reckless in regard to driving and this was known to the passenger at the time of the accident, in which event evidence of such knowledge upon the part of the passenger is admissible for the purpose of showing that he did not exercise ordinary care in keeping a lookout and warning the driver of the prudent course to be pursued by him.

If the liability is doubtful, or if it cannot be proved conclusively that the person injured had knowledge that the driver is or has been careless and reckless, then it is advisable to settle upon the best terms obtainable, provided the amount demanded is not unreasonable.

While regulation will never entirely eliminate accidents, a long step in the direction of reducing their number will be made when all drivers of automobiles are required to pass examinations for physical and mental fitness and familiarity with traffic regulations before being permitted to drive over the streets of a city. They are engine drivers and should possess all the qualifications required of an engineer or motorman. The outlook for such necessary requirements is not encouraging because of the self-interest of the governing classes and the difficulty of controlling the great number of unorganized individual owners of automobiles. The increasing death rate will eventually force the adoption of the requirement. In the meantime it is well to prepare for defense.

Bay State Street Railway Arbitration

Decision Grants Certain Increases, a Six-Year Scale and a Minimum Wage

The arbitration board in the Bay State Street Railway case handed down its finding at Boston, Mass., on June 21, with the result that the blue uniformed men of the company receive an increase in wages of ½ cent per hour above the present scale, covering the period from Oct. 1, 1914, to Oct. 1, 1915, and an increase of from ½ cent to 3 cents per hour above the present compensation for the period from Oct. 1, 1915, to Oct. 1, 1916. Extra men receive a guarantee of six hours work per day; the pay of shop men and all other employees is increased ½ cent per hour up to Oct. 1, 1915, and another ½ cent thereafter; the hours of shop men are reduced from ten to nine per day, and overtime is rated at time and one-half. A minimum wage of $2.25 per day is established after the first year's service for union men other than blue uniformed employees.

The Bay State case is one of the most elaborate ever carried through in street railway arbitration and frequent references to it have appeared in this paper. Hon. Joseph C. Pelletier, district attorney of Suffolk County, Mass., was the third member and chairman of the board. The company was represented on the board by Henry E. Reynolds, assistant general manager, and the men by James H. Vahey, of Boston. The hearings covered sixty-two days, the record comprising 6800 pages of testimony and 463 exhibits, including testimony at other hearings, reports of conferences, tabulations, schedules, etc.

The Bay State company has 951.33 miles of track, about 20 per cent of which is double track, and all but 13.26 miles are in the public streets. On Oct. 1, 1914, the company employed 1577 motormen and 1628 conductors, 296 call men and about 1000 in other occupations. Since 1906 there have been four agreements or arbitrations relative to wages.

The company claimed that it could not afford to increase wages. The men claimed that the financial condition of the company should not affect the question of a fair wage. The board confesses its inability to express an opinion as to the exact financial status of the company and then says: "If the street railways generally, and this company in particular, are in need of increased revenue, it is not within the power nor is it the duty of the employees to take the initiative in securing such revenue. If we find, as we do, that an increase of wages is necessary to compensate to some extent at least for the increased cost of living, and that a minimum wage should be established, it follows that the increased cost of labor must be either paid out of the present surplus earnings or laid upon the fare-paying public through increased rates. It appears from the statement of the company that there are no surplus earnings applicable to the purpose, and no evidence has been produced which warrants the conclusion that the company is not honestly and economically managed. This being the case, the only escape from difficulties which may mean hardship upon shareholders and inefficient service to the public seems to be such an increase of fares as the Public Service Commission may approve as adequate for the purpose. The employees should not be expected to await the results of such a proceeding, although the uncertainty of its outcome, both as to the amount of increased revenue and the time when it will accrue, may be taken into consideration in fixing the scale of increased wages and reduced hours."

The unions asked for a reduction of the existing eight-year graduated scale to two years, with an increase in wages from 24 cents to 30 cents per hour for the first year, and to a maximum of 35 cents the second year and thereafter, compared with the previous eight-year maximum of 28 cents. The board is impressed by the fact that of the thirty-one principal street railways in the State, only one company (with twelve men) has a flat rate, and that the average scale, taken by companies, is 6.3 years. At present 41 per cent of the men on the Bay State are receiving the maximum pay. The board holds that to determine when conductors and motormen attain their maximum efficiency is difficult and perhaps impossible. No evidence has been presented to justify the failure to raise for the fourth and fifth years over the third, or the seventh year over the sixth. An executive of the company admitted that the present scale is a compromise and unscientific, and the board sets six years as the length of time the new scale is to be effective.

In considering the rate of wage, the board notes that the men have fairly regular and continuous employment, in striking contrast with other occupations. "Work on the railways is nearly constant all the year around, while the joiner and the bricklayer are always in danger of being made idle by slackness of trade and the bricklayer's trade is further interrupted by frost and rain. Another consideration which means a money value to the men is the free transportation of these employees in the cars of the company to and from work; a daily expense to most men of at least 10 cents."

AWARD TO UNIFORMED MEN

The board finds the following rate of wages for conductors and motormen:

BAY STATE STREET RAILWAY WAGES AWARD MOTORMEN AND CONDUCTORS IN CENTS PER HOUR, 1915

Year	Present Wage	Asked	Offered by Company Oct. 1, 1914	Award as of Oct. 1, 1914
First	24	30	24.5	24.5
Second	25	35	25.5	25.5
Third	26	35	26.5	26.5
Fourth	26	35	26.5	26.5
Fifth	26	35	26.5	26.5
Sixth	27	35	27.5	27.5
Seventh	27	35	27.5	27.5
Eighth, etc.	28	35	28.5	28.5
			From Oct. 1, 1915	From Oct. 1, 1915
First	24	30	25	*24.5
Second	25	35	26	26
Third	26	35	27	27
Fourth	26	35	27	28
Fifth	26	35	27	29
Sixth	27	35	28	30
Seventh	27	35	28	30
Eighth, etc.	28	35	29	30

*Second half-year after Oct. 1, 25 cents.
Extra men given guarantee of six hours work per day.

Motormen and conductors having regular runs with outside time exceeding twelve hours are to be paid additional compensation at the rate of 15 per cent of the employee's regular hourly rate for the first excess hour or fraction of it and 30 per cent for the second excess hour or fraction, and at the same excess rate for any further excess. All work of extra men performed in excess of fourteen consecutive hours is to be paid for, as and in addition to the six hours daily guaranteed time, and additional compensation is to be paid at the rate of 25 per cent of the employee's regular hourly rate for the first excess hour or fraction of it, and 35 per cent for the second excess hour or fraction of it, with the latter excess rate for any further excess. The board finds that men running extra trips starting before 8 a. m. are to be allowed two hours for them, this applying to all early morning crews required to report to cover the list.

EMPLOYEES OTHER THAN CONDUCTORS AND MOTORMEN

About forty classes of employees other than motormen and conductors are involved in the finding of the board, which emphasizes the importance and skill of

their work, its hardships and the present time and rate of pay. It is but fair to the company, in the opinion of the board, to state that the difference between men in similar employment on its system is due to the original existence of different companies. Whenever a raise has been given in the past, it has applied throughout the system, but no attempt at uniform or union wages and conditions has been attempted. The board is of the opinion that men in the same occupation should receive the same wage regardless of their location and that hours should likewise be standardized. It finds that on and after July 1, 1915, these employees be placed on a basis of nine hours a day and eight hours on Sundays and holidays, but without extra pay on Sundays and holidays for such regular time. Such employees, when required to work overtime, are to be paid time and one-half for it. In lessening these hours, it is the intention of the board that the present total weekly wage be not reduced.

An analysis of the different rates paid employees of the shop, power house, etc., service shows a considerable variety of wages paid for similar work. Thus, armature winders receive six different hourly rates; carpenters, twenty-seven; coil winders, three; pitmen, twenty-one; babbiters, four; night watchmen, thirteen, etc. The board recommends that the company undertake a classification of wages and specifies a minimum wage of $2.25 per day for all employees who have worked one year for the company in the classes outside the blue uniformed service. This minimum wage is not to reduce existing wages in any case. The board finds that the rate of wages per hour for these employees shall be increased ½ cent per hour from Oct. 1, 1914, and another ½ cent from Oct. 1, 1915, extending to Oct. 1, 1916.

In conclusion, the arbitration board expresses its appreciation of the courtesy extended by all the parties and particularly congratulates the company for "the fine spirit shown in producing evidence and witnesses upon request of the association." The good spirit shown by the union in the proceedings is also touched upon. The board recognizes the difficulties of arriving at a decision completely satisfactory to everyone but states that it has done its best to deal fairly with all concerned. The report is signed by all three arbitrators, but the company's representative, Mr. Reynolds, states that while signing the award in the interests of harmony, he dissents, in principle and in amount, to the minimum wage which is therein established.

President Sullivan's Views

Commenting upon the decision for the press, President P. F. Sullivan said: "I have little to say about the award. Some of the increases are no more than might have been expected, considering the results of recent similar arbitrations, although we are in no position at present to meet any increase. The minimum wage as applied to our miscellaneous labor, however, is somewhat revolutionary. More than half of our labor outside of the blue uniformed men will be affected by this minimum, and the result remains to be seen. Henry Ford says it pays, but I am afraid the street railway business has not so much margin of profit with which to try experiments as has the manufacturer of automobiles. The award means that if the investors of the Bay State company shall receive a reasonable return on the investment, the price of transportation must be increased. The Bay State company has postponed as long as possible an increase in rates; it will now get ready to increase such rates."

It is estimated that the increased cost to the company as a result of the award will be about $300,000 in the two years ending Oct. 1, 1916.

COMMUNICATIONS

Jitneys vs. Light Cars

Mobile Light & Railroad Company

Mobile, Ala., June 10, 1915.

To the Editors:

From a four months' careful study and investigation of the jitney method of transportation I am satisfied that in all small towns and in the smaller cities up to 75,000 to 80,000 people, the best method of competing with the jitneys and killing them off is to give frequent service which, in the case of small towns and cities, can only be done with small light cars.

I have always opposed the use of double-truck cars for our service in Mobile. We use exclusively the single-truck cars, except on our suburban lines reaching out to small towns about 7 miles from the city. On these lines we operate double-truck cars carrying forty-eight people.

In Alabama, under the present motor-vehicle law, the cities have no right to regulate automobiles for hire nor to license them nor to require a permit other than under the provisions of the motor-vehicle bill, which was drawn up by automobile manufacturers. Notwithstanding this fact, which allows the jitney to operate at will, paying practically no taxes and without restrictions, we have been able to keep the number of jitneys down to the minimum. At the present time we have two white and three negro jitneys; the greatest number at any one time has been fourteen. The jitneys have never paid expenses, and of the first that started in, not one is now in business. But as some quit others take their places, and I believe this condition will continue for some time to come. I also believe that unless laws are passed increasing their taxes and requiring them to give indemnity bonds some jitneys may be able to operate during the rush hours with profit to themselves. For instance, the cost for the operator becomes practically negligible if the owner of the jitney has a boy who can work for an hour before school and for a couple of hours in the evening.

There is one jitney bus in Mobile which carries considerably more people than the seven-passenger car, and I would be more afraid if a regular line of jitney buses were placed in operation of the jitney becoming permanent. This kind of competition can best be kept out with small cars at frequent headway.

At the present time we are running on six-minute headway on Government Street, the street on which the two white jitneys operate. When depreciation is taken into consideration, the Government Street jitneys which are run by the owners are losing money, but it takes a few months before the jitney operator realizes what depreciation means. In the meantime he may possibly pay operating expenses; but he is practically living off of the investment in his machine, because at the end of a few months the machine is junk, and he has lost the money invested in it, which means he is unable to continue.

If we could operate on Government Street eight light cars, with 24-in. wheels, in place of the six cars we are now running, we could give a headway of five minutes instead of six. This would cut down the jitney's earnings and would increase our total earnings. Even though there were no jitneys in operation, the frequency of service increases riding by picking up the man who is walking, for if he continues to walk until he is within a reasonable distance of his destination, he will not get on the car. The cars would also secure as passengers many persons whom the private automobiles

now pick up. In fact, these private automobiles pick up more intending passengers than the jitneys. If we could decrease the headway to four minutes or three minutes, the jitneys would have a much harder time and would die so much sooner, and we would secure many of the persons as passengers who are now carried free by automobiles, and also induce more of the walkers to ride.

If we could operate one-man cars, there is no question in my mind but that we could keep the jitney out of the transportation business, but on account of the negro population the front entrance of a one-man car would be somewhat objectionable in the South, and as the idea is to give more frequent and rapid service, the motorman making change and issuing transfers would delay the car. Therefore, we still feel that two men are necessary on our cars, but that we should have small light cars having 24-in. wheels and low platforms so we can load and unload our passengers more rapidly and give more frequent and more rapid service. The more frequent the service the fewer the stops, and this means rapidity of service. The place where the jitney thrives is in small cities and towns where fifteen-minutes headway is maintained and long double-truck cars are run. Yet in many of these towns a man can walk over 75 per cent of the route in that time. If you are going to secure business from short-distance riders you have to give them frequent opportunity to ride.

To illustrate what frequency of service can do: When I was in a Texas city during the early part of February there were in operation 355 jitneys, which had reduced the revenue of the street car company $1,000 per day, less than $3 per day per jitney, yet when I talked with the taxicab men, garage men and others that were posted, I was informed that the jitneys were taking in from $5 to $6 and more per day. This shows that about half of their receipts were from riders that would not have used the street cars even if there had been no jitneys. Part of this riding was novelty riding, no doubt, but a large portion of it was caused by the fact that the jitney came along about every two minutes and sometimes oftener, and this provided a means of reaching town so frequently that the passenger did not have the opportunity of walking any distance before he had the chance of riding offered him.

Here in Mobile we have, as I have said (except on suburban runs), single-truck cars, seating twenty-eight to thirty-two passengers. If all of our cars (outside of our double-truck cars) had been light-weight cars seating twenty-four to twenty-eight passengers, on light trucks, with two 15-hp motors, we could have operated a sufficiently larger number of cars, with no more expense, to have kept the jitneys from paying daily operating expenses, and our receipts would have been higher by the increased riding caused by the more frequent service.

I believe that if the automobile manufacturers would get out a gasoline engine that could be put on a small light car that could be run on rails, such cars would be adopted to-day wherever a new line is being built in small towns or between small towns, and I believe there is a future for the small gasoline street car, unless small electric motors and light cars can be built. The development of automobiles has been much more rapid than the development of street cars and motors, but I am in hopes that the manufacturers of electrical apparatus will be able to develop a small motor and lighter control that will answer the present need.

Let us suppose a case, say, of a small city of 15,000 people which desires a system of transportation. Part of the streets only are paved, so that it is impossible to operate jitneys all over the town. A company is organized, rails are laid and small gasoline cars are operated, the engines for the cars being designed by some of the engine makers now building engines for automobiles. I will assume that the cars are operated by one man and seat twelve to twenty passengers and are able to give six to seven and one-half minutes headway. Could not a system like the above operate more cheaply than an electric system giving fifteen-minutes headway with the present type of heavy cars? And on account of the more frequent headway would not their receipts be larger and would there be much chance for a jitney to exist in competition on the paved streets, which are apt to be the streets on which the best car lines operate?

Before jitneys began operating in Mobile we issued bulletins in the newspapers giving estimated operating expenses and receipts of jitneys and showing the injury to the general business of a town caused by jitneys and the irresponsibility of the jitney in every way. We believe these bulletins had a good deal to do with our success in keeping the maximum number so low, but the fact that we have always given frequent service with single-truck cars left no opening for any number of jitneys to operate. If our cars had been smaller and we therefore were operating a greater number at no more cost the jitney would have fared even worse.

In our fight with the jitneys we have never decreased car service, but have added service at the right times so that the jitney found it unprofitable to compete with us. The additional service cost us a small amount of money per day, but nothing in comparison with what we would have lost to the jitneys if we had not fought them with their own weapon, that is, frequency of service.

J. H. WILSON, President.

NEW YORK, June 18, 1915.

To the Editors:

I have been much interested in the editorial discussion in your paper on the effect of the jitney on the desirability of small car operation. There is no doubt that small cars can be operated at a much lower cost per car-mile than large cars and that the more frequent service will encourage riding.

If we say that the ordinary two-man operation with a mixture of single and double-truck cars represents an average cost of approximately 15 cents per car-mile and that one-man light cars can be operated at 9 cents per car-mile, a conservative figure, the saving for a company operating 1,000,000 car-miles per year would be $60,000. If flagmen are required at railroad crossings, this figure would be slightly increased. If, in addition to the adoption of the type of car referred to, a zone system was installed and transfers were eliminated, additional benefits would be derived. To sum up:

1. The use of transfers reduces the average earnings of most railway systems to between 4 cents and 4½ cents per passenger. Therefore, the suggestion is made that transfers be either eliminated or given only when a 5-cent fare is paid.

2. A zone system could be established and tickets be sold at the rate of eight for 25 cents for rides within the first zone of say not to exceed two miles. This reduced fare would, in the writer's opinion, immediately be the means of recovering say 50 per cent of the jitney riders. With this reduction in jitney riders the jitneys could not exist, and within a short period of time all of the present jitney riders would again be street car riders.

3. The reduced fare would encourage many people to ride who now walk within a 1 and 1½-mile zone, and who would ride neither a jitney nor a car at 5 cents per

ride. This would result in additional business which has never before been enjoyed by the cars or jitneys. It is assumed that in some instances the additional riding from this source might be 30 per cent of the whole.

4. Collect a second 3⅛ cent fare from those riding beyond the limits of the first zone, thus making a 6¼ cent fare to outlying districts, which would more nearly compensate the railway company for this long-haul riding.

It is the firm belief of the writer that the adoption of the above rate suggestion will re-establish gross earnings on a higher basis than they were before the advent of the jitney, and irrespective of jitneys this measure would be beneficial to both the community and the company in small and medium-sized cities.

Jitneys cannot hope to carry passengers at 3⅛ cents per trip. The introduction of a zone system and the collection of a 3⅛ cent fare for a short haul, 6¼ cents for a long haul, the elimination of the transfer, or possibly the issuing of the transfer on a 5-cent cash fare, would, no doubt, meet with great favor on the part of the riding public, the city and the state officials.

The introduction of one-man cars is likely to meet with opposition from the labor unions and from the general public unless they are educated up to this question. The answer to the former is that more cars will be operated and thus will provide employment to more than half the present number of men. The answer to the latter is that the accident hazard is very much less with a one-man car than with a two-man car, as evidenced by statistics shown in the accompanying table from railway properties under the same general management, the aggregate gross earning of which for the year 1914 were $599,000. The average of the injuries and damage account for all of these companies was 3.75 per cent of the gross earnings. Two of the railway properties in this group were one-man operated and four of the properties operated with two men. The gross earnings of the one-man operated properties aggregated about 26 per cent of that for all the properties, and the injuries and damage account for this group was 1 per cent of the gross. The injuries and damage accounts of the four two-man operated properties averaged 4.7 per cent.

It may be objected that a zone system is impracticable with one-man operation. This is not the case. Both hand operated and automatic registering fare boxes are available and will overcome this difficulty. A one-zone passenger would place a ticket in the fare box on entering the car, and a two-zone passenger would place a ticket in the fare box when entering and another when leaving the car. A passenger entering a car in the second zone would not pay until leaving the car, therefore, every passenger leaving the car in the second zone would pay when passing out.

In some instances railroad crossings might be considered an obstacle. However, a considerable saving can in nearly every case be effected by establishing a flagman at railroad crossings or, if railroad crossings are near a congested traffic center, car riders could be provided to ride from the railroad crossings to the congested district and back.

The long-haul riders would object to paying a 6¼ cent fare. But as they represent an average of probably not more than 30 per cent of the total riders the vote of the larger proportion of reduced-fare riders would counteract such opposition. There might be some opposition on the part of the people to the elimination of transfers, but as an alternative the issuing of transfers might be continued on the payment of a 5-cent cash fare.

The introduction of small, one-man operated cars should be made a condition precedent to the establishing of a lower rate of fare, and it is believed that by placing on the system and operating one demonstration car, the general public and state and municipal authorities may easily be convinced of the efficiency of such means of transportation.

A condensed summary of the benefits to be derived from the adoption of the two general foregoing suggestions would be as follows:

Present operating expenses, 1,000,000 miles per annum..	$150,000
Operating expenses, 1,250,000 miles with one-man cars...	112,500
Annual saving in operating expenses.....	$37,500
Present gross earnings, 1,000,000 miles at 20 cents.....	$200,000
Recovery of 50 per cent of jitney riders.....	23,437
Additional short-haul riders who now walk.....	31,250
Additional revenue from second-zone riders.....	875
Total gross revenue.....	$255,562
Reduction due to 3⅛-cent fare.....	37,500
Gross earnings with one-man cars and new zone system	$218,062
Net increase in gross earnings.....	$18,062
Saving in operating expenses.....	37,500
Total additional net earnings.....	$55,562
Estimated operating ratio.....	51.6 per cent

The foregoing is a conservative estimate of the result of applying the suggestions to the railway company listed as "D" in the following table:

INJURIES AND DAMAGES ACCOUNT, YEAR 1914, FOR SIX RAILWAY PROPERTIES, OPERATED UNDER SAME GENERAL MANAGEMENT

	Gross Earnings	Injuries and Damages	Injuries and Damages as Per Cent of Gross Earnings
City railway, A.....	$119,099.62	$2,420.85	2.03
*City railway, B.....	142,866.88	1,517.88	1.06
*City railway, C.....	9,136.43	25.24	0.28
City railway, D.....	268,531.39	16,089.43	6.00
City railway, E.....	†38,402.59	1,775.90	†4.63
City railway, F.....	21,079.88	635.88	3.02
Totals	$599,116.79	$22,465.18	3.75

*One-man operated.
†Average for 2 years—1913 and 1914.

Many companies are probably in such a position that they could not finance additional car purchases at this time. In that event the savings to be derived from the modified plan of operation would permit the purchase of additional cars by the issuing of car trust certificates. The savings would be more than adequate to provide for a sinking fund to retire such certificates. Note that light one-man cars will reduce the operating accounts under every operating account classification, and the savings will not be limited to power and platform labor, as might naturally be assumed.

Short cars need not necessarily be rough riders. It is safe to assume that the equipment available will give easy riding, longer wheelbase and a minimum maintenance cost. Furthermore, it is quite within the range of possibility that one-man four-wheel cars suitable for train operation will be developed.

Note that cross-seats are a source of trouble and expense, and particularly objectionable in the case of one-man operation for the reason that the motorman would not have the time available for turning the seats. It is the writer's belief that the public can easily be converted to the longitudinal seats for short hauls providing such type of seat is introduced coincident with the new and attractive type of car.

A feature worthy of note is that the adoption of light cars will also permit the use of very much lighter track, or, in the case of heavy track now laid, will prolong its life. In either case track maintenance expense will be materially reduced.

The adoption of light cars will reduce the required investment for power station and substations to the

extent of $1,000 to $2,000 per car, or, in the case of the existing properties, will permit the operation of a greatly increased car mileage.

No attempt has been made to discuss schedules or minor transportation problems incident to the adoption of small cars. In general, there will be fewer stops and less time consumed in making stops, therefore, it should be possible to operate faster schedules, especially during rush hours. RAILWAY OPERATOR.

Electric Locomotive Design

McHENRY & MURRAY, ENGINEERS
NEW HAVEN, CONN., June 14, 1915.

To the Editors:

In the issue of the ELECTRIC RAILWAY JOURNAL for June 5 an article written by A. H. Armstrong, descriptive of the Chicago, Milwaukee & St. Paul locomotives, was published. This contained several statements with which I find it difficult to agree.

On page 1072, referring to the capacity of the locomotive motors, Mr. Armstrong states: "The motor has a continuous capacity of 375 hp. Special interest attaches to the large continuous capacity of the St. Paul locomotive, as this is the first instance where such a liberal motor capacity has been required and provided for." Several electric locomotives have already been built and are in successful operation with continuous horse-power capacities per axle much greater than the above. The horse-power per axle of the Chicago, Milwaukee & St. Paul locomotives is given as 375, continuously, or 430 on an hourly basis. The latest information as to the Norfolk & Western locomotives gives the continuous capacity of the motors as 400 hp per axle, with a correspondingly greater output on an hourly basis. The hourly capacity of the motors of the Loetschberg locomotive, Switzerland, is stated to be more than 500 hp per axle, whereas the corresponding figure for the new three-phase locomotives built for the Italian State Railways is authoritatively stated to be approximately 870 hp per axle.

It is also difficult to follow the reasoning by which Mr. Armstrong reaches the conclusion that, as a general proposition, a coefficient of adhesion of 17.75 per cent is admissible for electric locomotives operating on ruling mountain grades. Steam locomotives for freight work are commonly proportioned so as to exert maximum tractive efforts corresponding to a coefficient of adhesion which varies from 22.5 per cent to 25 per cent. A 10-per cent reduction in tonnage rating is the usual practice on steep grades. This corresponds to coefficients of adhesion varying from 20.5 per cent to 22.75 per cent. Accepting the lower figure (20.5 per cent) then to this should be added the increase in available tractive effort due to the equal turning effort of the electric locomotive when compared with the pulsating effort of the steam locomotive. This increase is not 10 per cent, as Mr. Armstrong states, but amounts to 20 per cent* and gives an equivalent coefficient of adhesion for the electric locomotive of approximately 25 per cent. Assuming a 2.2 per cent grade and an acceleration rate of 0.1 m.p.h.p.s., then the tractive effort required for acceleration is only 17 per cent of the total. With this allowance deducted, we get a net tractive effort available for hauling the tonnage corresponding to a coefficient of adhesion of 21 per cent. This is approximately 20 per cent greater than the figure quoted by Mr. Armstrong. In other words, an electric locomotive rated and designed on Mr. Armstrong's basis would sacrifice 20 per cent of its available adhesion, which means that 20 per cent more trains would need to be run for the same total tonnage moved.

Admitting, however, that under abnormal conditions, with coefficients of 21 per cent, tonnage would have to be sacrificed, yet even so, for mountain grade work it is surely preferable to design electric locomotives so as to utilize their full adhesion for say 90 per cent of the time, rather than to handicap them permanently because of conditions applying to only 10 per cent of the time, conditions which can be separately negotiated when they arise. WILLIAM ARTHUR, Assistant Engineer.

*See C. R. Henderson, "Locomotive Operation," page 206.

Experience with Ventilated Motors

PITTSBURGH RAILWAYS COMPANY,
PITTSBURGH, PA., June 14, 1915.

To the Editors:

In connection with the discussion on the subject of ventilated motors which has been going on for some weeks, and with particular reference to the article by R. E. Hellmund and a discussion of the same article by H. H. Adams, of Chicago, I would say that we have had a large number of ventilated motors in service for several years.

We are inclined to favor the parallel-path type of ventilated motor, i. e., one in which the air is drawn in on the one end of the motor and divides into two streams, one passing through the ventilating ducts in the core of the armature, the other stream passing between the field coil and over the surface of the armature, both streams being discharged at the other end of the motor.

Our experience with the motors so far has been similar to that referred to by Mr. Adams, in that a slight deposit of dust is found in the ventilating ducts of the armature and on the exterior surface of the insulation of the field coils.

We have also found that it is quite difficult to obtain the actual temperature of ventilated motors, when testing in the ordinary manner, after the car has been in actual passenger service, since the heat-radiating feature of the ventilated motor is such that a large and unknown quantity of heat is dissipated before thermometers can be placed. So that a test by thermometer to determine the actual temperature rise of this type of motor in regular service is liable to be more or less misleading. For determining motor temperatures in this manner, it is best to refrain from moving the car any more than is absolutely necessary.

Aside from the collection of dust inside the motor, which so far has not proved serious, I really know no disadvantages in this type of motor, and it would seem reasonable that the life of the insulation of the ventilated motor should be greater than that of one of the non-ventilated type, since even in actual service the heat generated during the accelerating period is largely dissipated in coasting and braking.

F. R. PHILLIPS, Superintendent of Equipment.

Reminiscences of Veteran Employee

Jacob Fishback, assistant superintendent of the Louisville Railway, is a veteran in the service, having been with the company in one capacity or another since the early '70's. He "reminisced" the other day, to say that in those times the mule drivers of the company had from four minutes to six minutes to eat their meals, and worked from twelve to fifteen hours a day at from 12½ cents to 15 cents an hour, standing out on the unsheltered platform in all weathers. He recalled a time in 1876 when all the company's mules were disqualified by epizootic. The drivers at the old carhouse which once stood at Fifth and Oak Streets, decided to make a trip during one of the rush periods and the company promised them all the fares they took in. Eight men laid hold of a car and pulled it downtown and back again. The fare they demanded and received was 25 cents per passenger, with no transfers.

ANNUAL CONVENTION SAN FRANCISCO OCTOBER 4 to 8, 1915

American Association News

ANNUAL CONVENTION SAN FRANCISCO OCTOBER 4 TO 8, 1915

Two-Day Session of Committee on Way Matters in Chicago—Committee on Equipment Meets with Electrical Committee of National Fire Protection Association—Company Section Activity

COMMITTEE ON WAY MATTERS

Full attendance of the committee on way matters of the Engineering Association and complete reports from all of its sub-committees marked the two-day session held in Chicago, Ill., on June 11 and 12. Those present were C. S. Kimball, Washington, D. C., chairman; H. F. Merker, East St. Louis, Ill.; E. H. Berry, Cincinnati, Ohio; E. P. Roundey, Syracuse, N. Y.; R. C. Cram, Brooklyn, N. Y.; C. W. Gennet, Jr., Chicago, Ill.; W. F. Graves, Montreal, P. Q.; L. A. Mitchell, Anderson, Ind., and E. M. Haas, Chicago, Ill. No new subjects were introduced at this meeting, but the final reports upon those assigned to the committee were discussed in detail, revised and put in final form. On the subject of further consideration of proper foundations for track in paved streets the committee decided to recommend for adoption Types B and C as presented in the 1914 committee report, excepting that they were modified slightly. This conclusion was reached after a full discussion and after obtaining the recommendations of a number of prominent way engineers throughout the country.

The report upon pavements for use in connection with girder rail will take the form of recommendations by the committee on the merits of the various types. In connection with this report, traffic counts taken in Brooklyn, Montreal, Cincinnati, Anderson, Chicago, Syracuse and Washington will be presented. These counts were made according to the method recommended by the 1914 committee. Because the Society for Testing Materials had expressed a desire to take up the question of specifications for sundry track materials, the final report on this subject will not be made this year. Revised recommended designs for 7-in. and 9-in. joint plates with special reference to sizes of bolts and fits were also submitted and incorporated in the report. Completely revised conventional signs for use in railway profiles, maps and plans and conforming as far as possible to those adopted by the American Railway Engineering Association and the Interstate Commerce Commission were adopted for publication in this year's report.

The entire session of June 12 was devoted to the preparation of special-work specifications. A committee of manufacturers, upon request, had submitted specifications for special work made of solid manganese steel, cast steel with hard centers, rolled-rail arms iron bound with hard centers, plain bolted and standard section rail bound with hard centers. Since these were the first special-work specifications ever prepared by this committee extreme care was exercised in their consideration. As revised these specifications will largely cover the chemical and physical properties of the materials used, general requirements and finish for five types of special work. The manufacturers' committee was represented by Victor Angerer, vice-president William Wharton, Jr., & Company; Charles A. Alden, chief engineer Pennsylvania Steel Company; R. B. Fisher, chief engineer Buda Company; E. B. Entwisle, chief engineer Lorain Steel Company, and G. C. Lucas, general manager Cleveland Frog & Crossing Company.

In connection with the various subjects discussed, in order to clarify and terminology, the committee decided on the following nomenclature for rails: All A. S. C. E. and A. R. A. sections to be known as standard-section rail; all high T-rail sections to be known as plain girder rail; all grooved sections to be known as grooved girder rail; all girder rail with flat wagon treads to be known as tram girder rail, and all girder rail guards to be known as guard girder rail.

COMMITTEE ON EQUIPMENT

On June 8 in Boston there was held a meeting of the electrical committee of the National Fire Protection Association, of which Martin Schreiber is a member, at which a draft of rules for car wiring was considered. The meeting was a joint one between the equipment committee of the Railway Association and representatives of the Underwriters' Laboratory, the Fire Underwriters' Electrical Bureau, the General Electric Company, the Westinghouse Electric & Manufacturing Company, the American Car & Foundry Company, The J. G. Brill Company, the New York Board of Fire Underwriters and the Underwriters' Association of the middle department. The purpose of the conference was to draft rules to properly safeguard fire hazard and give reliability and continuity of service as well as efficient operation of cars at reasonable cost. The rules were drafted and approved by the electrical committee for insertion in the National Electrical Code to replace the present obsolete ones. The revised rules will appear in the report of the Railway Association committee on equipment, and the San Francisco convention will be asked to approve them from the association standpoint, although such action is not necessary for their inclusion in the code.

DENVER TRAMWAY SECTION

As announced in the issue for May 29, the May meeting of the Denver Tramway Company section, the concluding one of the season, was devoted to the subject of the inspector and his duties. In his paper on this topic, O. A. Waller, road officer of the company, gave his audience an impression of the human side of the inspector's work. He showed that inspection is not confined to railways but is a necessary element in all lines of work. The inspector system is not a system of espionage but is a necessary element in discipline. It insures smooth and regular operation, and makes it possible to continue such operation when one man drops out of his place. Proper inspection is a protection to the loyal employee, preventing "skinning the line," running ahead of schedule, "stealing the right-of-way," and other offenses against good discipline. Among the inspector's duties is that of intervening in any case of trouble that may arise in connection with car operation. He must assist in getting cars under way in cases of blockade; he must endeavor to help any employee who is having trouble with his car; he must be always on the lookout to serve the public, thereby serving the best interests of his company; his work requires good judgment, unfailing courtesy, and almost superhuman tact.

In the discussion of Mr. Waller's paper, Inspector E. T. Eckland showed how the inspector had developed on the local property from a person aloof from the men, whose duty was to report infractions of the rules, into one who is a real friend and helper of the men. Ten years ago efficiency was shown by the number of reports,

while now it is shown by the reverse. Mr. Eckland showed also that the word "discipline" is often taken to mean punishment, while the best discipline is characterized by the lack of punishment. Discipline, like charity, should begin at home. The trainman's point of view was given by John W. Dawson of the South Division. After referring humorously to his supposed function of exposing the dark and mysterious ways of the inspector, he paid a tribute to the helpfulness of that dignitary. In a pinch the trainman is greatly relieved to have the inspector at hand, although the former is not always as appreciative as he might be. Promotion to the position of inspector is a reward for faithful service, so that the inspector is entitled to respect and cooperation.

PUBLIC SERVICE SECTION

Company section No. 2 held its last meeting for the season on June 17, with a good attendance in spite of a severe storm which kept many away. The program comprised talks by Charles E. Eveleth, commercial engineer car equipment, General Electric Company, and Morris B. Rosevear, superintendent of distribution Public Service Railway.

With the aid of many diagrams thrown upon the screen Mr. Eveleth showed how operating conditions affect energy consumption in car operation. He took up the different variables separately to demonstrate how variations in acceleration, braking, length of stop, etc., affect energy consumption with different numbers of stops per mile. Each variable separately permits a considerable range in energy consumption even under practicable working conditions. The talk gave the members of the local section an excellent idea of the elements of good car operation. He incidentally touched upon the use of the tapped-field motor, stating that savings of from 4 to 6 per cent could be obtained by using it.

Mr. Rosevear analyzed the work of the distribution department of the company, commenting upon the kinds of supplies used in distribution and signal work. By means of a series of slides he showed typical overhead and signal construction, describing some of the peculiar problems which had to be met in overhead work particularly in connection with contactors for operating track switches.

MANILA SECTION

The fifth monthly meeting of joint company section No. 5 was held in Manila on May 4. The attendance at the meeting was very large and included a number of prominent business men of the city.

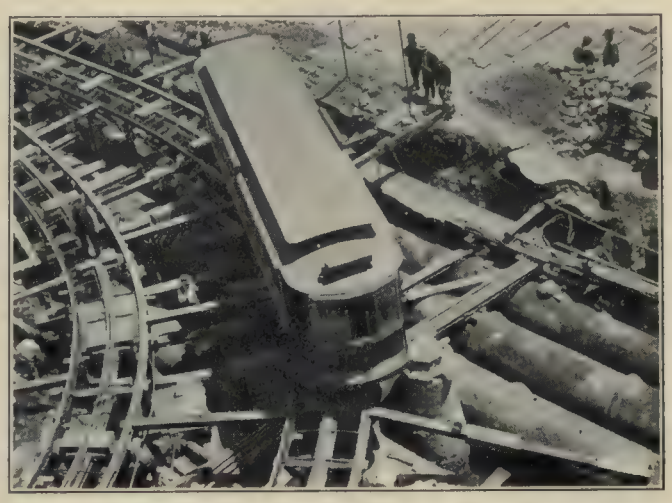
The paper of the evening was on "The Relative Advantages and Disadvantages of Private and Government Owned Public Utilities," by W. R. McGeachin, manager of the railway department of the Manila Electric Railroad & Light Company. This was followed by a spirited discussion which, with the paper, will be briefly abstracted in a later issue of the ELECTRIC RAILWAY JOURNAL. C. N. Duffy, vice-president of the company, stated that a number of individuals outside the employ of the company had been invited to become associate members of the section and that more than one-fourth of these had accepted.

The free public library of New Haven, Conn., has instituted a branch library at the Grand Avenue carhouse of the local electric railway, the Connecticut Company. The library is open for the delivery of books every pay day, which is Wednesday. Books of fiction and books on electricity are proving most popular.

Operating Conduit Railway Over Broken Water Main in New York

Undermining of Big Conduit by Water Forces Railway to Meet with Unusual Conditions—Schedule Is Maintained Without Difficulty

The accompanying illustrations show unusual railway operating conditions on one of the lines of the New York Railways at the corner of 109th Street and Manhattan Avenue. Five 48-in. cast-iron water lines extend under Manhattan Avenue, four of them leading to the reservoir in Central Park. A break occurred in one of these pipes on the night of June 3, caused by the



UNUSUAL OPERATING CONDITIONS ON NEW YORK RAILWAYS

ANOTHER VIEW SHOWING TEMPORARY TRACK SUPPORTS

undermining of the big conduit by the water from a small leak. The break occurred directly below the point where the street car tracks form a curve between the two intersecting streets. The leak was not caused by shocks from the electric railway because the railway tracks were supported on I-beams from walls placed between the pipes for the very purpose of preventing shocks. Fortunately the construction of the conduit railway is such that the track and conduit form a self-contained structure, the rails and conduit being attached to the same cast-iron yokes. It was possible therefore to install temporary supports and car service was maintained without difficulty. The break disclosed a dangerous situation in view of the fact that the high apartment houses adjoining were in danger of being undermined from a break of this kind.

Equipment and Its Maintenance

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

(Contributions from the Men in the Field Are Solicited and Will be Paid for at Special Rates.)

The Life of Way Structure as Affected by Engineering and Municipal Conditions

BY P. NEY WILSON, ROADMASTER CONNECTICUT COMPANY, NEW HAVEN, CONN.

Concerning the period in which rails should be renewed in paved streets, it appears that if the problem is left to the railway company to solve, a good practical method of procedure is to renew when the annual cost of maintenance of the tracks and pavement is greater than the depreciation plus interest on the investment as represented by the replacement cost.

For example:

STREET "A"

5000 ft. double track, laid 1894.
Five-minute headway.
7-in., 70-lb. tee-rail. Electric welded 1908.
Rock asphalt pavement on 6-in. concrete base.

Cost of Replacement:			
10,000 ft. track at $6.00		$60,000.00	
Interest on investment at 5%	$3,000.00		
Depreciation at 5%	3,000.00		
			$6,000.00
Cost of maintenance of present track structure and pavement:			
1911		$11,957.44	
1912		1,385.62	
1913		501.82	
1914		1,879.10	
		$15,723.98	
Average cost per year			$3,940.00
Net saving			$2,060.00

NOTE—The year 1911 shows heavy maintenance cost on account of unusual amount of pavement repairs.

An analysis of the above figures shows that it is still profitable to maintain the old track. When the maintenance figure reaches $6,000 per year or over it will then be more economical to replace the old structure.

In this particular case the railway company will probably have the opportunity to be the judge of the proper time for the renewal as the pavement now is in good condition outside of the track area.

The increase in automobile traffic has created such a tremendous demand for smooth pavements that the city and state officials in charge of highways have spent great sums of money for so-called permanent pavements, particularly in the last few years. In many instances pavement has been renewed from three to five years before the old track and pavement had reached a point where replacement was really necessary.

These heavy and unnecessary expenses are thrust upon the operating heads, thereby greatly handicapping the property and harassing its officials. Usually no good business reasons for renewals are given except the pressure of public opinion as represented by a few individuals who have no such investment to carry and no responsibility as to results.

A great difference of opinion, no doubt, exists as to when permanent pavement may be economically placed around an old track structure. This is a problem not so easily solved. Those seeking its solution will always find a set of conditions peculiar to that particular structure.

Calculation as to head wear of the rail, probable life, etc., may throw some light on the question, but it occurs to the writer that it may properly be considered a business proposition and the following is a suggested method which may be of interest.

Depreciation is figured at 5 per cent. This percentage is open to criticism and may be raised to conform to local conditions, type of pavement, car service and vehicular traffic.

PROBLEM

Street "B"—4000 ft. single track. Apparent result of allowing old track structure to remain in the street, placing new pavement around it, the city having decided to lay a new pavement of improved type. Present track structure good for five years.

Pavement cost at $3.50 per foot		$14,000.00	
5% interest for five years	$3,500.00		
20% depreciation for five years	14,000.00		
		17,500.00	
Cost to reproduce in five years (track and pavement)		24,000.00	
Total			$41,500.00
Effect of replacement, same street:			
Replacement cost at $6.00 per foot		$24,000.00	
5% interest for five years	$6,000.00		
5% depreciation for five years	6,000.00		
		12,000.00	
			36,000.00
Saving due to complete renewal			$5,500.00

NOTE—Value of material reclaimed may be deducted from loss as shown, the amount determined largely by character of pavement used.

Assuming that the placing of an improved type of pavement is postponed for five years (the life of the track) a careful estimate based upon recorded costs on this particular street shows expenses for maintenance as follows:

Maintenance of old track and pavement:		
First year	$400.00	
Second year	800.00	
Third year	1,200.00	
Fourth year	1,600.00	
Fifth year, replacement	.....	
Maintenance for five years		$4,000.00

If a complete renewal is made the first year on account of new pavement being placed, the interest and depreciation totals $12,000 for the five years. The loss due to renewal at the first year therefore is the difference, or $8,000.

These deductions are offered as showing one method by which some light may be thrown on a difficult problem, and if they provoke criticism and discussion, whereby more light on this subject is presented, it is certainly worth while, for the street railway engineer's decision in matters of this kind is important and involves large amounts.

In T-rail track construction in paved streets, from the viewpoint of head wear only, the limit of life under service is indefinite. Note the results from head wear as shown in Fig. 1. This rail is now under five-minute service and has been used constantly for twenty years. It is obvious that the life of the girder rail section is governed largely by the depth of the head.

It is well known that the life of any rail section may be greatly prolonged by maintaining the tracks to at least a fair line and surface.

Two examples of rail wear in curves are shown in Figs. 2 and 3. It does not seem practicable to adopt a set rule governing the period in which rails should be renewed in curves.

The writer cannot entirely agree that the old adage,

"The life of the track is the life of the joint," has become passé. All improved facilities in this regard considered, the life of the joint still governs to a large extent the life of the track. Only in a few exceptional cases has the writer known of rails being renewed entirely on account of the head wear.

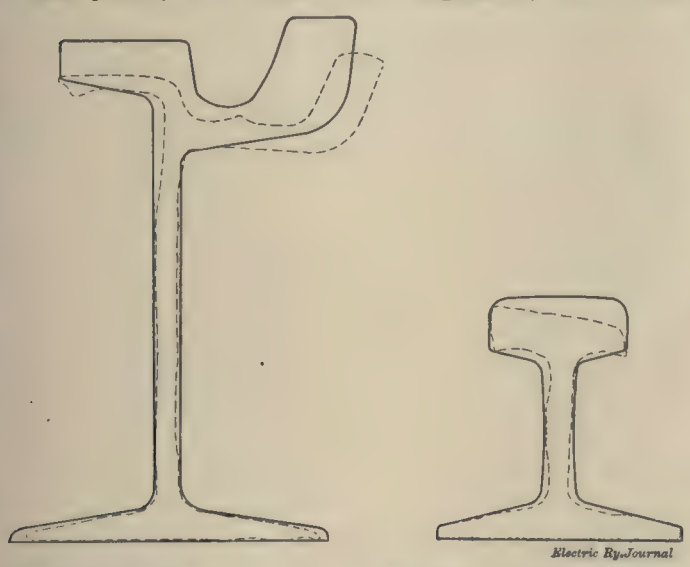
The most common reason for renewal of track in paved streets is an inadequate foundation. Of course,

In service twenty years.
Five-minute headway.
Double-truck cars.
Gravel ballast.
Chestnut ties—2 ft. centers.
6-in. concrete base for pavement.
Rock asphalt top.

FIG. 1—SECTION SHOWING RAIL WEAR OF 7-IN., 70-LB. T-RAIL

a great variety of conditions affect the replacement period; unfavorable conditions such as pavement failure, broken and badly cupped joints, foundation failure, change of location and rail wear. These unfavorable conditions are accumulative and frequently result in track being discarded some years before it would be otherwise. It is true that pavement, joint and foundation failures bear a close relationship to each other and it is true also that these failures are the usual reasons for replacement.

Bad joints, bad surface and alignment, loose rails,



Four-minute service.
Double-truck cars.
40-ft. radius, single guarded curve.
Wear on head 60 per cent of original section.
Total wear 24 per cent of original section.
Rail taken out March, 1915, on account of fracture under the head.

Ten-minute service, summer.
Twenty-minute service, winter.
Double-truck cars.
50-ft. radius curve, single guard.
Wear on head 50 per cent of original section.
Total wear 37 per cent of original section.
Rail removed on account of fracture in web at the joint.
February, 1915, rest of lay-out now in service.

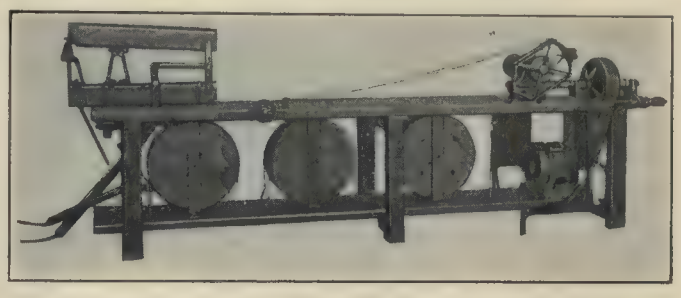
FIGS. 2 AND 3—SECTIONS OF GIRDER AND T-RAIL, SHOWING WEAR ON CURVES

rough, uneven pavement are more frequently the result than the cause of foundation failure. By foundation is meant the method used in supporting the rails, character of cross tie, spacing of same, depth and kind of ballast used, etc.

A Coil-Winding Unit

BY O. P. CHUBBUCK, SUPERINTENDENT OF SHOPS, ILLINOIS TRACTION SYSTEM

In order to give substation attendants work for leisure moments, the mechanical department of the Illinois Traction system built the coil-winding unit which is shown in the accompanying illustration. This unit is self-contained and is mounted on a substantially-built combined rack and bench so that it can be moved from one substation to another without dismantling. The unit method also eliminates countershafting because an installation is complete when the bench has been set in place. Beneath the bench three reels of wire may be mounted on as many brackets. These are so made that a reel can be easily removed in case another containing a different size of wire is to be substituted. Mounted at one end of the bench beside the reel rack, is a small



ILLINOIS TRACTION SYSTEM COIL WINDING UNIT

motor which drives the revolving forms used in winding coils. At the opposite end of the bench is a press with foot pedals, used in forming and completing the coils. The completed coils are taped by hand, dipped into a pan of insulating paint and placed on racks in a small baking oven heated by means of electric coils. This oven and pan are of portable size so that they also may be transferred between substations. The Illinois Traction System has been manufacturing its coils for some time and is well satisfied with the results. Later, if this experiment proves satisfactory, the substation attendants will receive other repair parts to finish. If this is done the mechanical department intends to adhere to the unit idea in assembling equipment for the work.

Electric Railway Freight in Maine

BY C. H. NOTTAGE, MASTER MECHANIC, LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY

There is a great field for the development of a freight business in the Androscoggin and Kennebec River valleys in the State of Maine, and the Lewiston, Augusta & Waterville Street Railway is making special efforts along this line. Shippers receive every encouragement, and rolling stock is provided to suit the needs of the various classes of traffic that originate on the route.

The view on page 1214 shows a motor freight car recently built by the Laconia Car Company for the railway. The body is 40 ft. over corner posts, has a steel underframe and is mounted on diamond-frame trucks with M. C. B. 4¼-in. x 8-in. journals in Gould journal boxes. The equipment includes four Westinghouse No. 56 motors and K-35-G controllers. The motors are spare machines that have been thoroughly overhauled. All cables are in wooden boxes bolted to the underframe, and thus are protected from moisture. The air brakes were furnished by the Westinghouse Traction Brake Company and are A M M quick service, graduated release quick recharge, high pressure emergency, automatic

equipment, with straight air application and release features. The compressor is of 25 cu. ft. capacity, and there are two main reservoirs 16 in. x 42 in. The motorman's valves are located at the extreme right-hand side of the vestibule to allow the operator a full view of trail cars when coupling and operating.

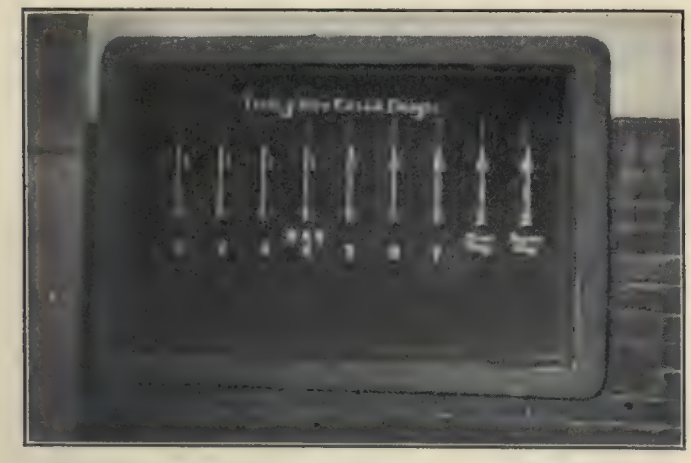
The Lewiston, Augusta & Waterville Street Railway has in operation at the present time eight motor freight cars, seventeen flat trailer cars and two box trailer cars

MOTOR FREIGHT CAR FOR LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY

of 60,000 lb. capacity each. The flat cars are used for handling granite from the Hallowell granite quarries, as well as wood and lumber, farming tools and general freight. The box cars are used for potatoes, apples, grain, hay and perishable goods. The company also transports the freight for the Eastern Steamship Company between Augusta and Gardiner and also handles freight cars from the steam roads.

Feeder Panel for Carhouse Trolley Wires

At the recently completed carhouse of the Holyoke (Mass.) Street Railway the overhead contact wires for the various bays are supplied with current from the positive feeders for trolley service, a control panel for the entire carhouse being located at one end of the establishment, as shown in the accompanying halftone. As a rule each bay contains three tracks, and the taps



CARHOUSE FEEDER PANEL AT HOLYOKE

feeding the three trolley wires for each one are supplied through a single-pole knife switch mounted with others of the same type on a recessed slate panel about 4 ft. long, 29 in. wide and set 6 in. deep into the wall. A slate border 1 in. thick provides additional protection. Nine circuits are separately fed through this compact and convenient board, which affords a high degree of protection in emergencies.

Car Maintenance Records at Los Angeles

For the twofold purpose of securing exact costs and spurring the division heads on to better results, the mechanical department of the Los Angeles Railway issues monthly comparative tabulations by divisions of car failures (pull-ins), wheel mileage and maintenance costs. The figures show such high reliability of service that they are well worth quoting. Those for April, 1915, which are reproduced in full, show the remarkable achievement of 1,207,319 miles per failure, or only 0.0001 per cent failure due to causes within the control of the mechanical department. The average mileage of cast-iron wheels between flats was 38,946 miles.

DIVISION PERCENTAGE—APRIL, 1915

DIVISION COMPARISON OF NUMBER OF MECHANICAL FAILURES FOR THE MONTH OF APRIL, 1915, WITH PERCENTAGE OF CARS OPERATED, AND MILES AND CARS PER FAILURE

Division	Cars Operated	Per Cent of Cars	Failures	Miles per Failure	Cars per Failure	Per Cent of Car Failures	Miles per Division
1	3,565	17.35	0	432,106	.....	.....	432,106.19
2	6,086	29.62	0	662,353	.....	.....	662,353.25
3	3,447	16.78	1	433,162	3,447	0.0003	433,162.36
4	4,027	19.60	0	496,103	.....	.....	496,103.30
5	3,421	16.65	1	390,912	3,421	0.0003	390,912.38
Totals and averages	20,546	100.00	2	1,207,319	10,273	0.0001	2,414,637.48

DIVISION COMPARISON OF SKID WHEELS REMOVED DURING THE MONTH

Division	Mileage	Pairs of Skid Wheels		Mileage per "Flat"	Mileage per Cent of Total
		Number	Cost		
1	432,106.19	4	$11.40	108,027	17.9
2	662,353.25	2	5.70	331,177	27.4
3	433,162.36	23	65.55	18,833	17.9
4	496,103.30	13	37.05	38,162	20.6
5	390,912.38	20	57.00	19,546	16.2
Totals and averages...	2,414,637.48	62	$176.70	38,946	100.0

DIVISION COMPARISON OF CARS REMOVED FROM SERVICE FOR THE CAUSES STATED

Division	Steps	Fenders	Glass	Miscellaneous	Wrecks	"O. K." Cars	Total	Miles per Car
1	25	[illegible]	7	3	1	0	45	9,603
2	46	6	10	7	5	0	74	8,951
3	10	[illegible]	[illegible]	10	1	0	31	13,973
4	30	6	10	13	4	1	64	7,752
5	10	3	4	5	1	[illegible]	28	13,961
Totals and averages.	121	28	37	38	12	6	242	9,978

DIVISION COMPARISON OF DAMAGES TO CARS

Division	Steps		Fenders		Damaged		Glass		Total	Cost per 1000 Miles
	Number	Cost	Number	Cost	Number	Cost	Number	Cost		
1	56	$106.67	26	$95.21	17	$72.21	19	$30.19	$304.28	$0 704
2	75	139.58	42	102.92	35	243.76	36	41.60	527.86	0.797
3	28	57.30	29	43.11	13	69.37	12	11.20	180.98	0 418
4	42	79.72	29	57.58	22	127.78	32	42.77	307.85	0.624
5	25	48.94	28	78.06	19	46.15	23	29.59	202.74	0.519
Totals and averages	226	$432.21	154	$376.88	106	$559.27	122	$155.35	$1523.71	$0.631

Another tabulation shows for what causes beyond the control of the mechanical department cars were taken to the shops. These items include torn-off steps, bent fenders, broken glass, etc. The mileage per failure made with these conditions included is also given, and the cost as well. It may be interesting to summarize the figures for the preceding months of 1915 as follows:

Miles per mechanical department failure: January, 491,606; February, 745,408; March, 826,113.

Percentage of car failures due to mechanical department: January, 0.0002 per cent; February, 0.0002 per cent; March, 0.00015 per cent.

Miles per failure, all causes: January, 12,168; February, 11,468; March, 14,082.

Miles per flat wheel: January, 51,209; February, 44,724; March, 56,326.

Repair cost per 1000 miles, all causes: January, $0.72; February, $0.60; March, $0.50.

Fuse Examination by Bureau of Standards

The Underwriters' Laboratories and the Economy Fuse & Manufacturing Company have jointly appealed to the Bureau of Standards for decision on the following question: "Has it been shown that the use of the fuses manufactured by the Economy Fuse & Manufacturing Company results in no greater fire or accident hazard than the use of other cartridge-inclosed fuses at present listed as standard by Underwriters' Laboratories?"

The evidence on which the decision will be rendered will include that which is presented by Underwriters' Laboratories, by the Economy Fuse & Manufacturing Company, by any other manufacturers of cartridge-inclosed fuses, and by state, city or insurance inspectors—all such evidence being subject to investigation or check by the Bureau of Standards as it may see fit.

In accordance with this arrangement the Bureau of Standards has announced that there will be a public hearing at its bureau in Washington, D. C., on July 8, beginning at 10 a. m. Invitations have been sent to manufacturers of cartridge fuses, underwriter associations and others to be present at this hearing and to present any statements of fact or results of experience which have a direct bearing on the question at issue. Written statements will be received by the bureau on or before the above-mentioned date in lieu of personal attendance at the hearing. Written arguments in rebuttal of any statements made at the hearing may be filed within fifteen days after the date of the hearing.

Simplifying Equipment Repairing

In the current issue of the *Tramway Bulletin*, the employees' magazine of the Denver Tramway Company, W. C. Metzger, foreman of the armature department, states that through the use of the electrolytic lightning arresters on the cars, improved operation of cars and better methods in the armature room, it is now possible for five men to look after the repairs of the following equipment: 245 motor passenger cars; thirty-two motor utility cars; 203 air compressors; ninety-one extra armatures of eleven types; 4200 field spools; 825 resistance boxes; 290 lightning arresters; forty stationary motors and starting boxes; all arc headlight resistors and coils; coasting clock coils; Kitt electric track switches; bonding car; concrete mixer; elevator motors; rock-quarry apparatus and crusher, and various pieces of electrical apparatus used on cars and in buildings. The number of armatures looked after is 1109.

Record-Breaking Gasoline Motor Car

An unusual gasoline car has just been built by the McKeen Motor Car Company, Omaha, Neb., for the Union Pacific Railroad. It is a 70-ft. baggage, mail and express car equipped with a 300-hp engine, and it has capacity sufficient to haul a standard steel railroad coach as a trailer, making a double-unit motor-car train with all the facilities of the ordinary light steam train comprising a locomotive, a tender and three passenger cars. A. L. Mohler, president Union Pacific Railroad, has, since the original conception of gasoline motor cars, advocated higher powered units, and this new 300-hp engine was designed to meet his views. The equipment of the baggage, mail, express car with power is the conception of Charles Ware, general manager Union Pacific Railroad, the idea being to substitute the motor car and coach for the existing local and branch line trains.

The past ten years' experience in operating gasoline motor cars has shown such a stimulated traffic from their use that, notwithstanding the growth in size from the early 30-ft. car to the 70-ft. passenger and power car hauling a 30-ft. trailer, the size of the gasoline equipment must be still further increased. The new double-unit was designed in consequence. Large revenue capacity in comparison to the low dead weight, high acceleration and facility (account of light weight) in making local stops, all tend to very much improved economic results in handling passengers, mail, express and baggage on main line locals as well as branch line trains. Greater economy, less depreciation, greater safety, higher speed, greater flexibility, higher earning capacity and greater stimulation of the public good will are some of the advantages of the double gasoline unit over the five-unit steam train.

On its initial trip the new car made a speed of 55 m.p.h., and it will now go into service between Kearney, Neb., and Stapleton, Neb., displacing the old-style steam train. The distance is 103 miles, involving a round trip of 206 miles a day, which will result in a monthly average of something over 6000 miles, exceeding the average monthly mileage of passenger locomotives. The seating capacity of the motor-car train is 78 passengers, while that of the displaced steam train was 70.

The McKeen, Type "D," 300-hp, reversible engine truck is an enlargement of the latest model, Type "C," foolproof, 200-hp motor truck, the present standards and design being the results of ten years' experience

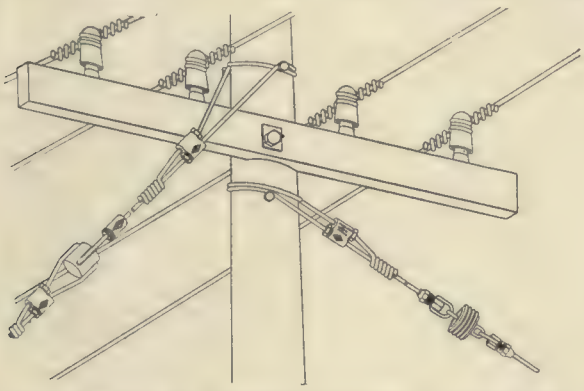
GASOLINE EXPRESS CAR WITH 300-HP ENGINE AND STEEL TRAIL COACH

in the practical operation of gasoline motor cars. The engine is reversed by air-pressure mechanism, the control of which, together with the throttle, is placed on the right hand side of the engine, enabling the motorman to remain seated while taking signals and operating the car and affording the maximum of ease and convenience. The weight on drivers is 33,800 lb., and the tractive effort, 8200 lb.

Mechanical Cable Connectors

Mechanical cable connectors that possess unusual features of reliability and rapidity of application have been brought out recently by the Fargo Manufacturing Company, Poughkeepsie, N. Y. These are made in two general types, of which one is a compression device whereby butt joints of cable ends are made so tightly that the metal is, to all practical purposes, actually welded together. The other is an ingenious scheme for twisting the ends of two cables together in much the same manner that a lineman makes connections except that the work of twisting is done mechanically, the lineman's pliers being replaced by a wrench, and the result is that absolute uniformity of each joint is attained with the expenditure of a minimum of time and skill. Both types are made in an infinite variety of forms.

The compression type of connection, known as "Type A," is made up of two couplings or sleeves, male and female, and two cone-shaped gripping cones with composition ends where they butt together. The cable ends that are to be connected pass through these gripping cones and when the couplings are screwed together the grips are wedged against the cables. At the same time they are drawn toward each other, so that the cable

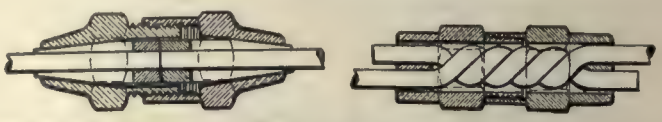


APPLICATION OF COMPRESSION-TYPE CABLE GRIPS

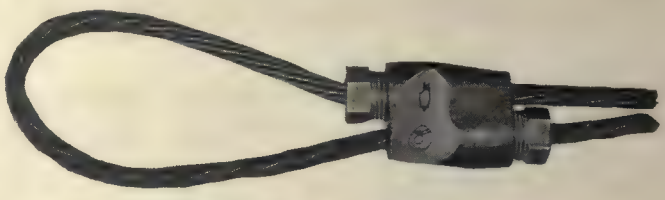
COMPRESSION-TYPE STEEL GUY GRIPS INSTALLED ON SPAN WIRE

ends can be pressed one against the other as tightly as desired. When the couplings are unscrewed the joint, of course, is broken and the cable ends are separated, but unless a wrench is used the joint has all the strength and conductivity of a weld. This has been demonstrated by sawing the couplings off a made-up joint, the grips being found to be stuck together so tightly that the joint between them could not be broken by the hands.

The Type A connections are used not only for conductors but also for guy wires, span wires and, in fact, in all cases where cables are ordinarily spliced, all common contingencies being provided for by variations that follow the general principle of the Type A straight connection. One of these is a steel cable grip in which the gripping cones are set side by side in a single casting, the pressure on the cable being applied by stuffing boxes that are screwed against the ends of the gripping cones. Another form, a guy grip especially adapted for span

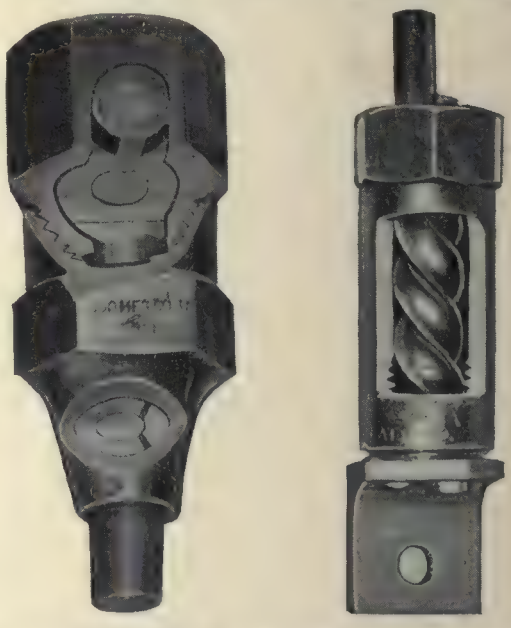


CROSS-SECTIONS OF COMPRESSION-TYPE AND TWISTED-TYPE STRAIGHT CABLE CONNECTIONS



CABLE GRIP OF COMPRESSION TYPE

wires, has a bail passed through the casting which takes the place of the male half of the coupling for the straight cable connection. This, like all the other forms of the general type, has its grip increased with a larger pull, and puts an absolutely even strain on all strands of the cable. The cutting of strands is naturally eliminated



TYPICAL CONNECTORS FILED AWAY TO SHOW CONSTRUCTION

and a great deal of time is saved in installation, as the only work involved is pushing the cable end into the grip and then screwing up several turns on the male casting. One lineman is said to place one of these cable grips in six minutes. The connections are made either with single or with double grips in series, the latter form, with its four gripping cones, being shown in one of the accompanying halftones.

The same general principle is applied to cable lugs, busbar connections, guy terminals with bolts that thread into the dead-ending insulator, terminal connections, ground points and even wye, ell, and tee connections. These various devices are made up merely by changing the shape of the casting that takes the place of the couplings in the straight cable connection.

The other general type of cable-connecting device, which is known as Type B, is made in practically all of the various forms suitable for the Type A construction. The principle involved is exceedingly simple, the cables

to be connected being merely passed through two holes in the ends of a pair of hollow couplings which are then screwed together. As the couplings turn the cables are twisted together in the hollow interior and at the same time are compressed longitudinally. In consequence, the twisted strands lie closely and evenly together, making a much better joint than could be made by hand pliers.

The strands are, of course, locked without cutting or denting and beyond any possibility of physical failure.

CABLE CONNECTION OF DOUBLE GRIP FORM AND ITS FOUR GRIPPING CONES

At the same time the casing formed by the hollow couplings constitutes a perfect protection, and keeps the wires always bright and in good condition electrically and mechanically. The casing, however, is not needed as a current conductor, as the conductivity of the bond between wires is increased 50 per cent over that of the line. As in the case of Type A, the Type B connectors are made for either single or double joints, the latter being provided for by an extra section of coupling with a central diaphragm containing two holes for the cables. This forms the joint in two twisted sections in series with each other.

Trolley Frogs for High-Speed Operation

Considerable interest has developed in the Type BR trolley frogs made by the Westinghouse Electric & Manufacturing Company, because of the claim that with this frog the trolley wheel never travels on its flanges. The value of this feature is readily apparent, particularly at points where high speeds obtain. Frog troubles at high speed are due largely to the fact that the trolley wheel travels on its flanges for a short space and a bump is caused when the bearing of the wheel transfers from the groove to the flange, which dislodges the wheel from the wire at these points.

In the Type BR frog, all this is avoided without the use of a shifting tongue or similar device, simply by the overlapping of the runners, as was shown in the illustration printed on page 428 of the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 27, 1915. There is practically a continuous contact of the tread of the wheel during the period of transition. Another effect of this continuous contact between the wheel and the frog is the possibility of using malleable iron frogs, with the consequent long life. The chief objection to malleable iron frogs heretofore has been the short life of trolley wheels owing to the burning of the flanges. As there is no running on the flanges with the Type BR frog this objection disappears. One more feature tending to increase the life of trolley wheels is pointed out by the manufacturers in connection with the Type BR frog; that is, that the frog can be placed almost directly over the track switch point because the trolley wheel does not have to be dragged angularly before entering the frog. This saves not only the wheel but the life of the trolley wire at this point. The frogs are made regularly in angles of 8 deg. and 15 deg. with malleable-iron bodies and bronze approaches.

Performance of Pennsylvania Railroad Locomotives

Some interesting figures have just been given out on the performance of the Westinghouse electric locomotives used by the Pennsylvania Railroad on the Manhattan Division, operating passenger trains through tunnels that enter New York under the Hudson River.

These locomotives were designed to start and accelerate a 550-ton train in addition to the locomotive, on a 1.93 per cent grade, but in actual operation 850-ton trains are frequently started on this grade and trains of fourteen all-steel cars, weighing more than 1000 tons, are handled without difficulty. The weight on drivers is 199,000 lb., and tractive efforts of 79,000 lb. have been registered in actual service. The continuous rating of each of the two motors with which the locomotive is equipped is 1000 hp and its weight is 43,000 lb.

Each locomotive in service passes over an inspection pit every twenty-four hours, the average time required for this inspection being approximately ten minutes. After 3000 miles the locomotives are taken into the shop for a general inspection. Shopping for general repairs is governed by tire wear, and mileages of from 90,000 to 112,000 are not unusual.

On Nov. 28, 1914, the thirty-three locomotives had completed four years' service, and during that period the mileage made and the detention record is as follows:

Locomotive-miles	3,974,746
Total engine failures	45
Locomotive-miles per detention	88,328
Total minutes detention to trains	271

During this period 463,558 train movements were made, or an average of 1300 movements per detention due to engine failures.

Dual Ownership in Alsace

Consul Milo A. Jewett at Kehl, Germany, reports that Strassburg, Alsace, encouraged by the good results of the joint ownership of lighting stations, made a similar change in the street railway organization in 1912. The old private street railway was reorganized. The capital of the new company was divided into $595,000 preferred stock, privately owned, and $595,000 common stock in the possession of the City Council. Both kinds of shares carry preferred dividends of 6 per cent. Of the remaining profit the city takes 30 per cent in dues for the use of the streets and bridges until the profit reaches $71,400; 40 per cent of the surplus profits between $71,400 and $95,200 and 50 per cent of the surplus over $95,200. The concession extends to 1965. The by-laws of the company were modified and adapted to the new agreement. The Municipal Council appoints four of the ten members of the board of directors. The length of the street railway in Strassburg is about 56 miles and there are 144 cars with motors and 319 trailers. The net profit for 1913 was $140,443, of which $3,570 was added to the reserve fund and $71,400 was paid as 6 per cent dividends on the capital stock; extra dividends of 1¾ per cent on the common stock and 4 per cent on the preferred stock were also paid. Thus the city received in first dividends $35,700; in dues (30 per cent of the surplus), $19,696; and extra dividends, $10,402; total, $65,798. To this sum may also be added the dividend on one extra majority share and that portion of the directors' percentage which falls to the four directors nominated by the Council. The above total received by the city is not net profit to the city, however, since the city must pay about half of the amount as interest on borrowed capital invested in the business and for reduction of liabilities.

News of Electric Railways

INTERURBAN MOTOR BUS SERVICE

In the Vicinity of Kansas City Many Automobile Lines Have Been Established as Electric Railway Feeders

In the immediate vicinity of Kansas City, Mo., the country is gradually being covered with a network of motor transportation service connecting the smaller towns of the outlying district with the city. For the most part buses are used, seating from twelve to twenty persons, but some smaller cars are also in service. The oldest line is that operated by Ray Renick, between the suburban manufacturing city of Leeds, about 2 miles to the east of the present built-up rim of Kansas City, and the terminus of the Twenty-seventh Street car line of the Metropolitan Street Railway. This line was first operated with horses, but in May, 1914, Mr. Renick put on a motor-driven bus. A half-hour schedule is maintained. The trip requires fifteen minutes and the twenty-passenger bus is usually well loaded. The fare is 10 cents.

Raytown, a small town 6 miles further to the east from Kansas City, beyond Leeds, also has a jitney service over a good rock road. The passengers pay 20 cents for the trip to the end of the Twenty-seventh Street line of the Metropolitan Street Railway, Kansas City.

F. W. Allen has established a motor-driven bus line between Belton, which has a population in excess of 1000 and is south of the city, through Grandview, Hickman Mill and Dodson to the corner of Thirteenth and Walnut Streets, in the heart of Kansas City, where connection is made with the Kansas City, Clay County & St. Joseph Railway. The distance is 20 miles, six of which parallel the Metropolitan Street Railway in the city. Mr. Allen does not consider this city service particularly profitable except as an advertisement of his service on the rest of the route he covers and he will probably discontinue the downtown run soon.

An autobus service between Parkville, Mo., a college town, and Kansas City, a distance of 9 miles, has proved profitable to the motor-bus owner, W. G. Leavel, who established it, for the reason that students use the line to and fro, going "out" in the morning and "in" in the evening, while the residents of Parkville come "in" in the morning and go "out" in the evening after a day's business or shopping. Thus the bus is loaded both ways. The one-way fare is 30 cents, with a charge of 50 cents for the round trip. North Kansas City, the new Swift-Armour suburban city across the river, is included in the route, which terminates at Eighth Street and Grand Avenue, Kansas City, Mo., and competes between North Kansas City and this point with the local traction system.

Independence, Mo., the eastern terminus of a Metropolitan Street Railway interurban line, now has two motor-bus lines connecting the rural towns Buckner and Osceola with Kansas City. The routes cover proposed trolley lines.

Another interurban feeder just established is the touring-car service between Platte City, Mo., which is a station on the Kansas City, Clay County & St. Joseph Railway, and Ferrell View, 8 miles beyond. This gives Ferrell View a Kansas City connection. Operation as yet is not on a fixed schedule.

The interurban motors are getting started also in the vicinity of St. Joseph. The latest line is that established by G. L. Rugg between Wathena, Mo., and St. Joseph. A combination Studebaker makes four round trips a day over 8 miles for 35 cents a single trip and supplements its passenger traffic with a light express traffic which consists largely in cargoes of butter, eggs and other country produce going "in" and supplies for the farm home going "out." Mr. Rugg plans to add a line from Wathema to Troy, a distance of 16 miles, making car service between Troy and St. Joseph, a distance of 24 miles. Residents of Wathema and Troy have been reaching St. Joseph by a roundabout steam railroad route. Motor-car service is also projected between St. Joseph and De Kalb.

The country-produce and store-delivery express business under proper regulation and restriction that will not permit delay and too much slowing of the schedule for passengers is growing. It has been made a feature of the new interurban autobus service between Independence and Wellington, Kan.

Probably the best, or at least the most prolific, development of interurban jitney service in this section is in the general vicinity of Springfield, Carthage, Webb City and Joplin. Here the Southwest Missouri Railroad operates 76 miles of interurban electric railway. In this territory the population is dense and organized communities numerous. Hence the autobus interurban, which fills in the unoccupied places and carries the people to a trolley connection. In some cases the company itself has instituted the autobus service. In others it has merely encouraged and co-operated with it. The latest line is from Carthage to Jasper, Mo., where a $30,000 bus line will cover the ground. Another is from Galena to Baxter Springs and another from Joplin to Neisho. Older routes in the Southwest Missouri section are from Joplin to Seneca, from Joplin to Granby and Diamond, from Granby to Neosho, from Carthage to Asbury and from Carthage to Golden City, a distance of 40 miles. There are also some lines out of Webb City and Springfield.

NEW SUBWAY LINES OPENED

Brooklyn celebrated the opening of the Fourth Avenue subway with appropriate exercises on Saturday afternoon, June 19, and opened the line for traffic on June 22. The company ran a special train carrying public officials and other interested citizens on Saturday afternoon. The train started from the Chambers Street station in the new Municipal Building, Manhattan, at 1:30 o'clock and made the run through the Fourth Avenue subway to Sixty-fifth Street, and thence over the tracks of the Brooklyn company's Sea Beach railroad to Coney Island. For the present the line will be operated over this route, but eventually it will be connected with elevated railroads running to Coney Island through New Utrecht Avenue and Gravesend Avenue and also with the Brighton Beach division of the Brooklyn Rapid Transit system. The New York Consolidated Railroad Company will operate the new line in accordance with the dual system lease, which provides for sharing the profits with the city.

On June 22, the Public Service Commission for the First District placed in operation the Steinway Tunnel line between Manhattan and Queens. This line runs from Forty-second Street, between Lexington and Third Avenues, Manhattan, under the East River to Jackson and Van Alst Avenues, Long Island City. Under the dual system contracts the title to the tunnel was transferred to the city, and it will be operated by the Interborough Rapid Transit Company with free transfers to and from the existing subway. The opening ceremonies were held at 11 o'clock, and the permanent operation for general traffic was begun at noon.

PROGRESS ON BOSTON TUNNEL

Rapid progress is being made by the Boston (Mass.) Transit Commission in the construction of the section of the Dorchester tunnel between upper Summer Street and the South Station. At Dewey Square one of the most important underground stations of the Boston rapid transit system is being built, and it is expected that by July 1 finishing work can be begun. Operation of the Summer Street section of the Dorchester tunnel will probably commence in the fall, providing rapid transit by trains of the Boston Elevated Railway between the South Station, Cambridge and points west. Upon the completion of the Dewey Square station it will be operated as a temporary terminal pending the extension of the tunnel along Fort Point Channel toward South Boston and Dorchester, and the new Washington station recently opened for traffic will become a way station. The Dewey Square station will include two platforms 350 ft. long for east-bound and west-bound traffic and a mezzanine lobby just below the street level, with escalator connections running to the exits. The station will be the lowest on the rapid transit system and will afford quick connection with

the Boston Elevated service east and west for passengers arriving in the city by the New York, New Haven & Hartford Railroad and the Boston & Albany Railroad. It is being built by the Hugh Nawn Contracting Company, of Boston, and the estimated cost of the station is $500,000. Work has been pushed day and night since last August, and 325 tons of earth have been removed daily without closing the square to traffic. The station will be 44 ft. deep and although extensive changes in piping, sewers and building supports have been required no serious accident has as yet occurred on the work.

THE CINCINNATI VALUATION

Ward Baldwin has been selected by Director of Public Service Fosdick and City Solicitor Schoenle of Cincinnati as engineer to take charge of the city's interests in the valuation of the property of the Cincinnati Traction Company which is now being made by the Ohio Public Utilities Commission. For a number of years Mr. Baldwin was professor of engineering in the University of Cincinnati and is now chief engineer of the trustees of the Cincinnati Southern Railway. At one time he was chief assistant engineer of the Southern Railway.

Replying to the request of the People's Power League that E. W. Bemis, Chicago, be selected for this post Mr. Schoenle said he is neither a civil nor a mechanical engineer and is not familiar with conditions in Cincinnati.

The court of Common Pleas has returned a judgment of $61,220 as the portion of the cost of the Ludlow Avenue viaduct that must be paid by the Cincinnati Traction Company. The Baltimore & Ohio Southwestern Railroad paid 65 per cent of the cost and the city sued the traction company for half of the remainder, claiming this to be due under an agreement in its franchise.

MUNICIPAL OWNERSHIP OPPOSED

Peter Witt, street railway commissioner of Cleveland, Ohio, replying to the demand of the Cleveland Socialists, recently went on record as opposed to the purchase of the Cleveland Railway property by the city at the present time. Mayor Newton D. Baker said that if the city purchased the railway property by issuing bonds a security franchise would have to be made in favor of the bondholders. Seemingly, he is of the same opinion as Mr. Witt with respect to the street railway, although he advocates taking over the property of the Cleveland Electric Illuminating Company as soon as possible.

The Broadway Improvement Association was organized at Cleveland on June 16 to oppose the granting of a franchise to the Cleveland & Youngstown Railroad Company that will close forty streets within the territory bounded by Broadway, Orange Avenue, East Ninth Street and East Thirty-fourth Street. At the meeting a resolution protesting against the grant was adopted. The franchise has been approved by the board of directors of the Builders' Exchange, following a tour of inspection of the line.

THE CLEVELAND & YOUNGSTOWN RAILROAD

The success of the effort of the Cleveland & Youngstown Railroad for a franchise for a high level freight terminal in the heart of Cleveland, Ohio, will probably depend on whether steam or electric power is to be used in the yards that have been planned. The company was originally incorporated to operate an electric railway, but Attorney J. L. Cannon told the City Council on June 21 that the company desired to use steam for the operation of the freight yards.

The public utilities and the transportation committees of the Cleveland Chamber of Commerce have both reported to the Council committee of the whole, approving the company's plan. The proposed location for the yards will damage private property less than any other place in the city, the reports say, and the fact that certain streets will be closed or diverted from their present course can be arranged satisfactorily. The company, however, has proposed a plan of building a subway that will prevent interference with Broadway and this will perhaps do away with much of the objection that has been made to the plan by property owners in the section to be used.

Pennsylvania Full-Crew Law.—Governor Brumbaugh has vetoed the bill designed to repeal the full-crew law of Pennsylvania.

Mr. Herr Honored.—Edwin M. Herr, president of the Westinghouse Electric & Manufacturing Company, received the honorary degree of Master of Arts on June 23 from Yale University, his alma mater.

Extension of Portland Electrification.—Robert E. Strahorn, president of the Portland, Eugene & Eastern Railroad, Portland, Ore., recently announced plans for the electrification of the line from Whiteson to Corvallis, a distance of 43 miles, in the near future.

Sale of New York Bonds.—The city of New York will receive bids on June 29 for the sale of $71,000,000 of 4½ per cent bonds. Of the proceeds $46,000,000 will be applied to payments on the new subway system, dock improvements and for water supply. Of the remaining $25,000,000 a considerable amount will be used for refunding purposes.

Detroit Purchase Action Postponed.—As the contract for the purchase by the city of the lines of the Detroit (Mich.) United Railway within the city was not in shape to be submitted to the stockholders of the company on June 16, the meeting to act on the plan to sell to the city was postponed and the question will not come before the stockholders on June 30.

Chicago Elevated Damage Decision.—Litigation between the estate of Edwin P. Brand and the elevated railroads in Chicago, for damages from construction of the so-called "downtown loop," was decided on June 21 by the Supreme Court of the United States in favor of the railroads, because of insufficient proof and without consideration of constitutional questions.

Electrification of Birmingham Suburban Line.—The Birmingham (Ala.) *News* referred recently to the possibility of the Atlanta, Birmingham & Atlantic Railroad being electrified in the immediate Birmingham district, Woodward and Bessemer, and the likelihood of the operation of electric cars of the Birmingham, Ensley & Bessemer Railroad over the two systems.

Opening of Chicago Arbitration Delayed.—It was expected that the arbitrators selected to pass upon the questions at issue between the Chicago Surface Lines and the Chicago Elevated Railways and their employees would begin their sessions on June 21, but the absence of State's Attorney Maclay Hoyne, representing the men, from the city resulted in a postponement to June 24. The company will be represented on the board by James M. Sheean. Mayor Thompson will act as umpire.

Seattle Lease Plan Defeated.—Action on the plan advocated by Alderman Allen Dale of Seattle, Wash., of leasing Division A of the Seattle Municipal Railway to the Puget Sound Traction, Light & Power Company has been indefinitely postponed. Alderman Dale favored the abandonment of municipal ownership of the railway by the city until after the franchises of the Puget Sound Traction, Light & Power Company expire in 1925 and 1934. He pointed out that this was the procedure followed in San Francisco.

Service Resumed in Alexandria.—The Southern Power & Traction Company, Alexandria, La., which suspended the operation of its railway lines on May 18, has resumed service pending the sale of the property to the city for $30,000. The inventory of the property of the company submitted to the city by I. B. White and C. F. Crockett, receivers of the company, totaled in value $67,633. The receivers said: "For all of this we will accept in full settlement the sum of $30,000 cash, with the further understanding that the city shall assume the paving charges or any other claims that it may have against the company."

The Philadelphia Transit Loan.—The surveys committee of Councils of Philadelphia has reported favorably a bill directing A. Merritt Taylor, director of city transit, to contract for the relocations and the rebuilding of certain sewers in Philadelphia in the interest of the proposed Broad Street subway and Frankford elevated line. The report of the sewer bill was followed by the passing of a resolution providing for additional stated meetings of both chambers of Councils on June 23 and 30 to act on the bills appro-

priating the money and authorizing contracts to be let for an immediate start on the work of transit improvement.

Subway Ventilation in New York.—The Public Service Commission for the First District of New York has adopted a resolution directing Alfred Craven, its chief engineer, to request the Interborough Rapid Transit Company and the New York Municipal Railway Corporation to designate their consulting engineers to act together with him as a board to investigate and report with recommendations upon the question of ventilation for the dual system subways. The consulting engineers of the Interborough Company are William Barclay Parsons and S. L. F. Deyo, and those of the New York Municipal Railway are Jacobs & Davies, Inc., and L. B. Stillwell.

Franchise Renewals Opposed.—The Board of Public Utilities of Los Angeles, Cal., has adopted and forwarded to the City Council a report which advocates temporary contracts instead of franchise renewals to public service corporations. The recommendations were based on the report submitted by Chief Railway Engineer F. C. Howell of the board. Mr. Howell said that the city could take over the lines as the franchises expired, but that this would involve heavy expenditures for renewals, etc., with only 7.67 miles of disconnected line on which franchises will expire before 1926. His idea, in short, embodies a plan under which the companies may continue to operate lines covered by expiring franchises until such time as the city is prepared to acquire and operate the lines.

Brooklyn Fender Order Modified.—By a vote of three to two the Public Service Commission for the First District of New York has adopted an order modifying its previous order, requiring the Brooklyn Heights Railroad and other companies of the Brooklyn Rapid Transit System operating surface cars, to equip their cars with wheel guards and projecting fenders. The effect of the modifying order is to relieve the companies from the requirement as to projecting fenders, while leaving the former order as to wheel guards in full force. Those who voted for the modifying order were Commissioners J. Sergeant Cram, George V. S. Williams and Robert C. Wood. The prevailing opinion was written by Commissioner Cram and a dissenting opinion was filed by Commissioner Hayward.

Banquet to Mr. Smith.—Daniel W. Smith, president of the Peter Smith Heater Company, was the principal guest at a dinner on June 15 given by a number of his railway, supply and other friends. This dinner was arranged to celebrate the anniversary of the arrival at Detroit of Mr. Smith's 110-ft. yacht purchased a year ago in New York. The following gentlemen accompanied Mr. Smith on his yacht from New York by way of the St. Lawrence River to Detroit: John J. Stanley, Cleveland; Peter Witt, Cleveland; David A. Belden, Haverhill, Mass.; Dr. Thaddeus Walker, Walkerville, Ont.; William Nagel, Detroit; George Stanton, Cleveland, and Dwight B. Dean, Cleveland. At the anniversary dinner a two-hundred piece set of dishes was presented to Mr. Smith. The design of the dishes exhibits the emblems of the New York Yacht Club, the Old Town Club of Detroit, and Mr. Smith's yacht, the *Virginia*.

Agreement on Cleveland Subway Terms.—An agreement was reached on June 21 between the city of Cleveland, Ohio, and the Cleveland, Akron & Canton Terminal Railroad on all the vital points in dispute. The company had insisted upon a franchise period of ninety-nine years, while the city desired that the grant be limited to seventy-five years. A compromise was reached at eighty-five years, making the rights expire on March 1, 2000, when the property will revert to the city. Another amendment provided for the valuation of made land at the foot of Fifty-third Street at the end of seventeen years. This value plus half the increment up to any date the city may actually purchase the land will be the price that is to be paid. The ordinance was placed on its second reading after these changes had been accepted and in all probability it will come up for passage at the next regular meeting. The franchise is for a freight subway under East Fifty-fifth Street to furnish an outlet from the lake to the southern end of the city and connect with all railroads that desire its service.

Toledo Rental Case.—A motion made by Councilman Hoffman at the meeting of the City Council of Toledo, Ohio, June 21 to take the matter of collecting rent from the Toledo Railways & Light Company for the use of the tracks on the Cherry Street bridge out of the hands of the sub-committee of the street railway committee was lost. Chairman Kilbury of the street railway committee said no action had been taken toward collecting the rent because it would "muddle the situation." He also considered the rent charge exorbitant. Councilman Ruppell insisted that the committee act in some way. If the rent was too high the committee should recommend a reduction; if not, then the company should be asked to pay it. Councilman Dotson, chairman of the franchise committee, said that the company should pay rent for the use of the bridge tracks, but to take any action now, when the committee and representatives of the company were so near an understanding on the franchise draft, would be inadvisable. He favored postponing any action until after the franchise was disposed of in some way.

Memorial Service for Dr. and Mrs. Pearson.—At 2 p. m. on June 23 memorial services were held at the Church of the Divine Paternity, New York, N. Y., for Dr. and Mrs. F. S. Pearson, who lost their lives on the *Lusitania*. The services were attended by a large number of the late Dr. Pearson's associates and friends, including delegations from the American Society of Mechanical Engineers, of which he was a member, and the New York Alumni of Tufts College, of which he was a graduate. Services at the church were conducted by the pastor, the Rev. Dr. Frank Oliver Hall. Tributes were paid to the memory of Dr. and Mrs. Pearson by Prof. William L. Hooper of Tufts College and E. W. Rice, Jr., president of the General Electric Company. Work was stopped for five minutes on the Denver & Salt Lake Railroad, of which Dr. Pearson was chairman of the board of directors, and on the Rio de Janeiro Tramway, Light & Power Company, the Sao Paulo Tramway, Light & Power Company, Barcelona Traction, Light & Power Company, the Mexican Light & Power Company and the Mexico Tramways.

Storm at Indianapolis.—The city of Indianapolis, Ind., was visited by a severe wind and rainstorm on the afternoon of June 13. One of the heaviest sufferers was the Indianapolis Traction & Terminal Company, the central damage spot being St. Clair Street, from Canal Street east to East Street. The pole line on this street carries eight to ten feeders, ranging in size from 500,000 circ. mil. to 1,000,000 circ. mil. A pole at Canal and St. Clair Streets snapped and the weight of the cables carried down the entire line of poles to East Street, a distance of ten blocks. Service was maintained on the feeders, although car operation on all lines crossing St. Clair Street was at a standstill. The broken poles were removed at once and the cables cleared from the roofs and pole tops and laid in the street. At the corner of Illinois and St. Clair Streets two temporary poles were set and the feeders tied to these in order to clear the Illinois street car line. Service on this line was resumed six hours after the accident, but the other car lines were forced to suspend until early the next morning. Except at car crossings, the feeders were allowed to remain on the street until a new line of poles, on the opposite side from the old, was set and new feeders installed.

Urbana Franchise Carried.—At a special election held at Urbana, Ohio, on June 1, the twenty-five-year interurban franchise of the Ohio Electric Railway was approved by a vote of 757 to 499. This terminates a fight which has been waged for more than a year between the company and an element which opposed the extension of the franchise at a time when the company's present franchise had nine years to run. At a previous election held last February, the franchise was rejected by an adverse majority of five, but was promptly re-enacted by the Council. The company's opponents thereupon invoked a referendum, securing 708 names to a referendum petition calling the election which has just been held. An aggressive publicity campaign, embracing newspapers, letters and circulars, was conducted in behalf of the franchise by F. B. Wright, Jr., the company's special representative, with the result that the opposition were able to muster only two-thirds as many votes against the franchise on election day as they had signers on their referendum petition. The importance of securing an extension of this interurban franchise lay in the fact that it was the only interurban franchise on the Ohio Electric Railway system which expired previous to the maturity of the company's bonds.

Financial and Corporate

ANNUAL REPORT

San Francisco Municipal Railways

The net profit on operation of the San Francisco (Cal.) Municipal Railways for the calendar year 1914 was $216,541. After deducting the comparison charges for services rendered by other departments of the municipal government, for insurance and for taxes—thus to show the accounts as if the railways were owned by a private corporation—the net profit was $112,476. In the comparison charge there is included $98,047 for federal, state and municipal taxes, and $6,018 for the estimated value of service rendered to the railway by other municipal departments. With the profits of 1914 added to those of the Geary Street Division for 1913, the total profit for two years, i.e., since the beginning of operations Dec. 28, 1912, was $301,887—or, after deduction of comparison charges, $157,780. An amount of $48,971 was taken from the surplus account and transferred to the general fund of the city and county of San Francisco.

The statement of income, profit and loss for the year follows:

Operating revenues:	
Passenger revenues	$1,150,236
Miscellaneous revenues	9,202
Total	$1,159,438
Operating expenses:	
Way and structures	$21,852
Equipment	48,083
Power	137,839
Conducting transportation	353,033
Traffic	356
General and miscellaneous	52,774
General and miscellaneous comparison charges required by charter	6,018
Depreciation—18 per cent of gross revenue	208,698
Total	$828,656
Net operating revenue	$330,782
Miscellaneous income—Income from municipal bonds owned	6,124
Gross income	$336,905
Deductions from income:	
Taxes—comparison charges required by charter:	
State franchise 5¼ per cent on gross revenue	$60,870
Municipal franchise 3 per cent on pass. revenue	34,507
Municipal car license	1,533
Federal income—1 per cent on net income	1,136
Total taxes	$98,047
Interest on funded debt	122,642
Other interest	3,740
Total	$224,429
Net profit for 1914	$112,476

The municipal railway pays no taxes, nor is any payment made for services rendered to it by other departments of the municipal government. The above income statement includes the comparison charges required by the charter.

Taking the profit shown above	$112,476
And adding comparison charge for legal and clerical services	6,018
And comparison charges for taxes	98,047
Produces the true net profit for the year	$216,541

As compared to the period from Dec. 28, 1912, to Dec. 31, 1913, the last year's results show, as stated below. The passenger revenues increased from $444,393 to $1,150,236, an amount of $705,843. This was caused by the addition to the Geary Street Municipal Railway, operating in 1913, of the Union Street Division in December, 1913, the Van Ness Avenue Line and Potrero Avenue Line to the Exposition grounds in August, 1914, and the Stockton Street, Columbus Avenue and North Point Line in December, 1914. As compared to the 1913 item of $354 there was a 1914 credit of $9,202 for miscellaneous revenues, so that the total operating revenues increased from $444,747 to $1,159,438, an amount of $714,691. The operating expenses increased from $291,431 to $828,656, an amount of $537,225. This increase was divided mostly as follows: Maintenance of way and structures, $16,193; maintenance of equipment, $37,522; traffic, $274; conducting transportation, $170,936; power (not segregated in 1913); general and miscellaneous, $44,384, and depreciation and injuries and damages, $128,643. The net operating revenue increased $177,466, and miscellaneous revenues $4,795. The deductions increased $115,088, and the net profit $67,172.

The reserve for depreciation and renewals is computed at 14 per cent of the gross operating revenues, instead of on annual percentages of physical value of the property. The rate of 14 per cent is arbitrary, being based on Chicago experience as reported by Bion J. Arnold (12 per cent) and the opinion of Delos F. Wilcox as expressed in a paper on "Elements of a Constructive Franchise Policy." There is added 4 per cent on the gross revenue for accidents:

The following table gives other statistical data for the year:

	Total Amount	Per Car Mile	Per Car Hour
Total passenger revenue	$1,150,236	$0.35046	$3.1745
Total operating expense	613,939	0.18706	1.6944
Operating earnings (taxes and depreciation not deducted)	$536,297	$0.16340	$1.4801
Ratio of earnings to passenger revenue	0.4662		
Total taxes and charter charges	$104,065	0.03171	0.2872
Ratio to passenger revenue	0.0905		
Operating expenses and taxes	$718,005	0.21877	1.9816
Ratio to passenger revenue	0.6242		
Depreciation	$208,699	0.06359	0.5760
Ratio to passenger revenue	0.1814		
Operating expenses and depreciation	$828,656	0.25248	2.2870
Operating expenses, depreciation and taxes	$926,703	0.28236	2.5576
Ratio to passenger revenue	0.8057		
Net income from operation	$223,533	0.06811	0.6169
Ratio to passenger revenue	0.1943		
Passenger car mileage	3,282,012		
Passenger car hours	362,333		
Total platform expense (37½ cents per hour, 8 hours per day)	$291,606	0.08885	0.8048

Number of cars owned	197
Total single-track mileage operated Dec. 31	37.24
Passengers carried	27,933,049
Revenue passengers carried at 5 cents	22,732,478

KANSAS CITY REORGANIZATION TIME EXTENDED

The time limit for the acceptance of the franchise granted the Kansas City Railways, under which title the street railway properties in Kansas City are to be reorganized, was to expire on July 7. This time limit was extended on June 21 by the lower house of the City Council for four months. The upper house referred the extension ordinance for a week. It was represented by aldermen in both houses that the franchise was favorable to the city and that the street railway interests should receive consideration on account of general financial conditions.

The proposal to extend the time for acceptance of the franchise reached the Council with a request from Mayor Jost for its granting and a special letter from Judge Hook of the Federal Court, in whose hands the street railway properties now lie under the receivership. Mayor Jost had declared that he would not countenance an extension of time unless it should be demonstrated to his satisfaction that the stockholders and the note and bondholders were reasonably near an agreement. His action in asking extension is taken to mean that such agreement is not hopeless.

The letter from Judge Hook to the Mayor follows:

"The time for the reorganization of the street railway properties of Kansas City will expire on July 7. So far I have left the initiative to certain committees of bondholders and stockholders, but they have been unable to agree upon a plan which in my opinion observes the purpose and spirit of the new franchise. My position has been that the new franchise is primarily for the benefit of the city and that the city has a direct interest in the character of the financial structure of the new company as affecting the ability of the company readily and fully to discharge during the life of the franchise all of its obligations to the public. Those obligations are many and substantial, and there would be danger if the reorganization were solely from the standpoint of the bondholder or the stockholder, or both.

"Though I have devoted very much more time to the matter than could reasonably be required by official duty, still I wish to make a final effort, and for that purpose I personally and earnestly request an extension of time for four months. I am preparing a plan of reorganization myself, the general outlines of which I have explained to you, and I will shortly submit it to the stockholders and bondholders for their adoption or rejection. If at any time during the period given me such opposition develops as will defeat the plan I propose, I shall promptly advise you and the Common Council so that the franchise ordinance may be repealed."

Alton, Jacksonville & Peoria Traction Company, Alton, Ill.—The Public Utilities Commission of Illinois has authorized the Alton, Jacksonville & Peoria Traction Company, recently taken out of receiver's hands, to issue $347,000 each of stocks and bonds. The commission was asked to authorize an issue of $1,270,000 in securities. It is stated that the property will be operated in conjunction with the East St. Louis & Suburban Railway, controlled by the Clark interests.

Dominion Power & Transmission Company, Ltd., Hamilton, Ont.—A dividend of 2 per cent has been declared on the $5,100,000 of limited preference stock of the Dominion Power & Transmission Company, Ltd., payable on July 15 to holders of record of June 15. This is the same amount as was paid on Dec. 15 last and leaves a dividend of ½ of 1 per cent to be paid, after which the stock becomes common stock.

Fairmount Park Transportation Company, Philadelphia, Pa.—The property of the Fairmount Park Transportation Company was sold under foreclosure on June 22 for $58,000 subject to $750,000 of mortgage bonds. The purchaser was P. E. Foederer, acting for the reorganization committee.

Fort Madison (Ia.) Street Railway.—The Mississippi Valley Electric Company, Iowa City, will take over the property of the Fort Madison Street Railway, provided the new franchise to the latter company which has been passed by the City Council is approved by the people at the election which is to be held on July 15. The property will be rehabilitated by the new owners.

Halifax (N. S.) Electric Tramway.—The Nova Scotia Tramways & Power Company has applied to the Board of Public Utility Commissioners of Nova Scotia for permission to proceed with its plans to take over the property of the Halifax Electric Tramway and the hydraulic development of the Nova Scotia Light & Power Company on the Gaspereau. The company's petition asks permission to increase the capital to $9,500,000 and to authorize $5,000,000 of first mortgage thirty-year 5 per cent gold bonds, $3,000,000 of the bonds to be issued at once and the balance to be reserved for future requirements. The stock is to be divided into 32,500 shares of preferred and 62,500 shares of common of a par value of $100 each. A public hearing on the petition will be held on July 7.

Interborough Consolidated Corporation, New York, N. Y.—The Interborough Consolidated Corporation announced that its preferred stock would be ready for delivery in exchange for preferred stock of the Interborough-Metropolitan Company on and after June 23. Voting trust certificates for the Interborough-Metropolitan preferred shares may be exchanged for either voting trust certificates of Interborough Consolidated preferred stock or for the preferred stock itself. Deposits of the Interborough-Metropolitan stock and certificates may be made at the company's offices. Deposits of voting trust certificates for Interborough-Metropolitan common stock will be received on and after July 6 for exchange for certificates of the new corporation. Application has been made to the New York Stock Exchange to list $45,740,500 of preferred stock and 932,621 shares of common stock voting trust certificates of the Interborough Consolidated Corporation. On June 23 the directors of the company declared from surplus a dividend of 1½ per cent on the preferred stock of the Interborough Consolidated Corporation, payable on July 6 to stockholders of record at the close of business July 3, 1915, and thereafter to the holders of all such preferred stock of the Interborough Consolidated Corporation as may be issued in exchange for the preferred stock of the Interborough-Metropolitan Company and the Finance & Holding Corporation. The directors have decided that hereafter dividend action will be taken quarterly.

Interstate Railways, Philadelphia, Pa.—There has been listed on the Philadelphia Stock Exchange $704,130 of permanent preferred stock of the Interstate Railways in shares of a par value of $10 each, full paid and non-assessable, countersigned and registered by the Real Estate Title, Insurance & Trust Company, Philadelphia, issued in exchange for a like amount of redeemable preferred stock of the company, surrendered and cancelled and stricken from the list.

Janesville & Madison Traction Company, Janesville, Wis.—The Janesville & Madison Traction Company has filed for record a mortgage for $1,344,000 in favor of the Peoples' Savings & Trust Company, Green Bay, Wis., authorized by the stockholders at a meeting on May 14 to provide funds with which to complete the proposed road of the company.

Lisbon (Portugal) Electric Tramways, Ltd.—The net financial result of operations of the Lisbon Electric Tramways, Ltd., for the calendar year 1914 was a profit of £84,708, making a total surplus of £86,457 at the end of the year. From this amount £15,000 was placed to the credit of the depreciation reserve, and £5,000 from the exchange reserve and £19,012 credited to premium on ordinary share capital were also transferred to the depreciation reserve. During the year the company carried 63,758,037 passengers, as compared to 58,840,923 in 1913. The increased cost of supplies and the falling off in the exchange rate, however, caused a diminution of the profits by nearly £20,000.

Municipal Railways, San Francisco, Cal.—It is expected that a considerable part of the earnings of the municipal railway system of San Francisco for the next year will be needed for the extension of the road through the Twin Peaks tunnel. With the tunnel nearly 25 per cent completed, plans are already being roughly sketched for financing the railroad through the tunnel and out into the territory beyond. At a recent meeting of the city's finance committee a resolution was ordered prepared providing for setting aside nearly $300,000 of the earnings of the municipal street railway system for investment in library or other bonds.

Plymouth & Sandwich Street Railway, Plymouth, Mass.—The Plymouth & Sandwich Street Railway has petitioned the Public Service Commission of Massachusetts for authority to issue 870 shares of additional preferred stock of a par value of $100 each, the proceeds to be used to pay off floating debt and to complete the extension of the railway in Plymouth, Bourne and Sandwich. The stock is to be offered to the present holders of common stock at $100 per share.

Republic Railway & Light Company, New York, N. Y.—H. F. McConnell & Company, New York, N. Y., say: "Provision has been made by the Republic Railway & Light Company to the issuance of a blanket mortgage to retire maturing bonds due this year and the note due on Jan. 1, 1916. Unsettled financial conditions, however, have caused the bankers to hesitate in offering these bonds for sale, although all arrangements have been made for underwriting the issue and taking care of maturing obligations. Officials of the company state that the dividend on the preferred stock is absolutely secure."

Southern Iowa Railway & Light Company, Albia, Ia.—A. C. Mueller, Davenport, has been appointed receiver of the Southern Iowa Railroad & Light Company as the result of a suit filed by the trustee under the mortgage securing the holders of the bonds of the company. On June 1, the company had maturing $9,000 of bonds, which it was unable to take up.

Southern Power & Traction Company, Alexandria, La.—The sum of $30,000 has been agreed upon as the price at which the city of Alexandria will take over the railway property of the Southern Power & Traction Company in Alexandria. As noted briefly elsewhere in this issue, the company has resumed the operation of its railway line pending the completion of the negotiations for the sale to the city.

Stockton Terminal & Eastern Railroad, Stockton, Cal.—The Railroad Commission of California has denied the application of the Stockton Terminal & Eastern Railroad for authority to issue $319,500 of bonds for the purpose of completing its road from Bellotta to Jenny Lind under an agreement with the De Mayo Engineering & Construction Company, New York. At the hearing of the application J. E. Adams, president of the company, stated that the opinion of the directors of the company was divided on the subject.

Tidewater Southern Railway, Stockton, Cal.—Subscriptions for $100,000 of securities of the Tidewater Southern Railway have been advanced in Modesta, Ceres and Turlock to cover the proposed extension of the line from Modesta

through Ceres to Turlock. The total cost of the extension is estimated at $180,000, of which $80,000 has been subscribed outside of Stanislaus County.

Washington Railway & Electric Company, Washington, D. C.—Negotiations are being conducted in Washington for the merger of the Capital Traction Company and the Washington Railway & Electric Company. It is now said that the only thing standing in the way of an agreement between the two companies is whether proposed collateral trust bonds to be issued by the Washington Railway & Electric Company in exchange for the capital stock of the Capital Traction Company shall bear 5 per cent or 6 per cent interest. The proposed bond issue would be secured by deposit with the trustee, to be named, of the entire stock issue of the Capital Traction Company. Failure to meet payments on the collateral trust bonds when due would result in the reversion of the Capital Traction Company shares to the holders of the collateral trust bonds. The Capital Traction Company has outstanding $12,000,000 of stock on which dividends of 6 per cent a year have been paid since 1905. The proposed basis of exchange of the stock for bonds has not been divulged. Besides requiring the approval of the stockholders of both corporations the plan would also have to be approved by the Public Service Commission of the District of Columbia and by the national Congress.

Western Ohio Railway, Lima, Ohio.—Application has been made to the Public Utilities Commission of Ohio by the Western Ohio Railroad for permission to sell its property to the Western Ohio Railway. Application has also been made to sell its property in Sidney to the Standard Power & Equipment Company.

DIVIDENDS DECLARED

Asheville Power & Light Company, Asheville, N. C., quarterly, 1¾ per cent, preferred.

California Railway & Power Company, San Francisco, Cal., quarterly, 1¾ per cent, prior preferred stock.

Carolina Power & Light Company, Raleigh, N. C., quarterly, 1¾ per cent, preferred.

Cincinnati & Hamilton Traction Company, Cincinnati, Ohio, quarterly, 1¼ per cent, preferred; quarterly, 1 per cent, common.

Cincinnati, Newport & Covington Light & Traction Company, Covington, Ky., 1⅛ per cent, preferred; quarterly, 1½ per cent, common.

Cincinnati (Ohio) Street Railway, quarterly, 1½ per cent.

City Railway, Dayton, Ohio, quarterly, 1½ per cent, common and preferred.

Columbia Railway, Gas & Electric Company, Columbia, S. C., quarterly, 1½ per cent, preferred.

Columbus (Ga.) Electric Company, 3 per cent, preferred.

Columbus Railway, Power & Light Company, Columbus, Ohio, quarterly, 1½ per cent, preferred A.

Consolidated Traction Company of New Jersey, Newark, N. J., 2 per cent.

Germantown (Pa.) Passenger Railway, quarterly, $1.31¼.

Halifax (N. S.) Electric Tramway, quarterly, 2 per cent.

Hestonville, Mantau & Fairmont Passenger Railway, Philadelphia, Pa., $1.50, preferred; $1, common.

Interborough Consolidated Corporation, New York, N. Y., quarterly, 1½ per cent, preferred.

New York State Railways, Rochester, N. Y., quarterly, 1¼ per cent, preferred; quarterly, 1 per cent, common.

Public Service Corporation of New Jersey, Newark, N. J., quarterly, 1½ per cent.

Reading (Pa.) Traction Company, 75 cents.

Republic Railway & Light Company, New York, N. Y., quarterly, 1½ per cent, preferred.

Ridge Avenue Passenger Railway, Philadelphia, Pa., quarterly, $3.

Tri-City Railway & Light Company, Davenport, Ia., quarterly, 1 per cent, common.

Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md., quarterly, 1½ per cent, preferred.

Washington Water Power Company, Spokane, Wash., quarterly, 1½ per cent.

West India Electric Company, Ltd., Kingston, Jamaica, quarterly, 1¼ per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
ATLANTIC SHORE RAILWAY, KENNEBUNK, MAINE					
1m., May, '15	$27,879	$25,319	$2,560	$685	$1,675
1 " " '14	27,199	23,563	3,636	650	2,986
AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL.					
1m., Apr., '15	$142,011	$96,837	$45,174	$40,039	$5,135
1 " " '14	155,640	105,492	50,148	37,383	12,765
10 " " '15	1,653,821	1,061,363	592,457	398,809	193,648
10 " " '14	1,733,775	1,093,703	640,072	380,655	259,417
BERKSHIRE STREET RAILWAY, PITTSFIELD, MASS.					
1m., Apr., '15	$69,861	*$61,584	$8,277	$17,177	†‡$8,809
1 " " '14	70,566	*37,738	32,828	32,502	‡405
10 " " '15	795,163	*715,698	79,465	172,338	†‡91,472
10 " " '14	822,454	*720,077	102,377	170,764	†‡66,812
CLEVELAND, PAINESVILLE & EASTERN RAILROAD, WILLOUGHBY, OHIO					
1m., Apr., '15	$30,151	*$18,266	$11,886	$10,961	$925
1 " " '14	31,896	*17,316	14,580	11,005	3,575
4 " " '15	113,038	*69,127	43,911	43,779	132
4 " " '14	115,833	*66,498	49,335	43,789	5,546
THE CONNECTICUT COMPANY, NEW HAVEN, CONN.					
1m., Apr., '15	$612,898	*$449,561	$163,337	$98,178	‡$86,710
1 " " '14	618,574	*414,349	204,225	88,372	‡137,269
10 " " '15	6,587,443	*4,809,690	1,777,753	982,711	‡1,011,255
10 " " '14	6,626,482	*4,878,424	1,748,058	890,634	‡1,074,659
FORT WAYNE & NORTHERN INDIANA TRACTION COMPANY, FORT WAYNE, IND.					
1m., Apr., '15	$135,938	$80,340	$55,598	$53,257	‡$2,624
1 " " '14	146,264	86,078	60,186	52,640	‡7,673
4 " " '15	566,280	324,105	242,175	213,871	‡29,623
4 " " '14	606,695	346,617	260,078	205,612	‡55,498
HUDSON & MANHATTAN RAILROAD, NEW YORK, N. Y.					
1m., Apr., '15	$465,488	*$190,929	$274,559	$211,748	$62,811
1 " " '14	484,776	*196,942	287,834	208,008	79,826
4 " " '15	1,861,908	*777,400	1,084,507	844,852	239,655
4 " " '14	1,911,468	787,848	1,123,020	831,199	292,421
INTERBOROUGH RAPID TRANSIT COMPANY, NEW YORK, N. Y.					
1m., Apr., '15	$2,926,690	*$1,268,849	$1,657,841	$907,378	‡$806,365
1 " " '14	3,020,204	*1,245,325	1,774,879	907,378	‡904,740
10 " " '15	27,839,526	*12,556,348	15,283,178	9,091,690	‡6,684,503
10 " " '14	27,851,791	*12,472,276	15,379,551	9,299,842	‡6,581,146
KENTUCKY TRACTION & TERMINAL COMPANY, LEXINGTON, KY.					
1m., Apr., '15	$63,612	$33,153	$30,059	$29,754	‡$15,193
1 " " '14	62,538	34,872	27,666	20,739	‡11,346
10 " " '15	673,217	358,307	314,910	197,748	‡144,690
10 " " '14	639,170	338,121	301,049	204,862	‡123,675
LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO					
1m., Apr., '15	$101,548	*$71,191	$30,357	$35,963	†$5,606
1 " " '14	109,200	*75,175	34,025	35,287	†1,262
4 " " '15	391,307	*282,175	109,132	143,871	†34,739
4 " " '14	410,161	*278,344	131,817	140,929	†9,111
NEW YORK & STAMFORD RAILWAY, PORT CHESTER, N. Y.					
1m., Apr., '15	$25,508	*$23,247	$2,261	$7,976	†‡$5,692
1 " " '14	25,903	*23,520	2,383	7,807	†‡5,402
10 " " '15	308,568	*255,950	52,618	79,061	†‡26,070
10 " " '14	301,058	*248,200	52,858	77,301	†‡24,054
NEW YORK, WESTCHESTER & BOSTON RAILWAY, NEW YORK, N. Y.					
1m., Apr., '15	$37,555	*$48,041	†$5,486	$5,990	†‡$11,407
1 " " '14	34,340	*41,385	†7,045	5,013	†‡11,624
10 " " '15	366,508	*435,442	†68,934	63,608	†‡130,881
10 " " '14	325,413	*480,065	†154,652	57,159	†‡206,939
NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO					
1m., Apr., '15	$279,282	*$183,538	$95,744	$51,423	$44,321
1 " " '14	287,719	*173,322	114,397	50,331	64,066
4 " " '15	1,101,351	*709,451	391,900	204,437	187,463
4 " " '14	1,080,884	*668,302	412,582	200,155	212,427
PACIFIC GAS & ELECTRIC COMPANY, SACRAMENTO, CAL.					
3m., Mar., '15	4,749,327	*2,290,725	2,458,602	1,104,231	‡1,425,685
3 " " '14	4,342,576	*2,237,961	2,104,615	1,108,079	‡1,094,898
PHILADELPHIA (PA.) RAPID TRANSIT COMPANY					
1m., May, '15	$2,070,160	$1,213,939	$856,221	$817,319	$38,902
1 " " '14	2,178,843	1,260,510	918,332	605,473	112,859
11 " " '15	21,846,967	12,700,116	9,146,851	8,918,780	228,071
11 " " '14	22,195,756	13,089,983	9,105,773	8,817,810	287,963
PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.					
1m., Apr., '15	$442,526	*$248,634	$193,892	$182,985	$10,907
1 " " '14	533,973	*286,989	246,984	176,595	70,389
12 " " '15	5,886,595	*3,182,996	2,703,599	2,202,489	501,110
12 " " '14	6,751,158	*3,335,666	3,415,492	2,082,284	1,333,208
REPUBLIC RAILWAY & LIGHT COMPANY, NEW YORK, N. Y.					
1m., Mar., '15	$242,236	*$157,143	$85,094	$56,840	‡$28,257
1 " " '14	248,882	*156,756	92,126	55,963	‡36,208
3 " " '15	724,837	*456,844	267,993	170,634	‡97,625
3 " " '14	739,118	*466,070	273,048	166,682	‡106,586
THE RHODE ISLAND COMPANY, PROVIDENCE, R. I.					
1m., Apr., '15	$349,814	*$329,941	$19,873	$117,301	†‡$70,607
1 " " '14	415,948	*304,859	111,089	111,264	†‡26,425
10 " " '15	4,263,809	*3,308,088	955,721	1,179,249	†‡129,672
10 " " '14	4,404,417	*3,301,197	1,103,220	1,080,699	‡139,363
VIRGINIA RAILWAY & POWER COMPANY, RICHMOND, VA.					
1m., Apr., '15	$410,943	$201,145	$209,798	$136,904	‡$80,505
1 " " '14	420,582	192,998	227,584	134,969	‡98,842
10 " " '15	4,271,727	2,060,012	2,211,715	1,362,488	‡916,559
10 " " '14	4,284,090	2,048,974	2,235,116	1,343,958	‡961,903
WESTCHESTER STREET RAILROAD, WHITE PLAINS, N. Y.					
1m., Apr., '15	$19,369	*$21,097	†$1,728	$1,449	†‡$3,168
1 " " '14	19,384	*21,241	†1,857	1,190	†‡3,043
10 " " '15	213,056	*224,792	†11,736	13,168	†‡24,799
10 " " '14	205,064	*214,789	†9,725	11,098	†‡20,638

*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

THE JITNEY BUS

The Jitney Problem in Philadelphia—Company's Interesting Tabulation of Bond and License Requirements in Ordinances Already Passed

The question of jitney regulation is before the law committee of the Select and Common Councils of Philadelphia. The original ordinance fixed the license fee at $25 for each car, with a liability bond of $2,500. On June 18 the law committee approved a bill that called for a license fee of $50 and a liability bond of $2,500 for all jitneys and taxicabs. The committee decided, however, that in case of a company operating more than ten cabs or cars it shall put up a single bond of $50,000. The committee also decided upon zone rates.

The case of the Philadelphia Rapid Transit Company was presented to the committee of the Councils in the form of a memorandum from T. E. Mitten, president of the company, to which was appended a statement of taxes paid by the company in 1914 and a table giving information in regard to the indemnity bonds and license fees that are required in various cities which have enacted regulatory ordinances.

The statement of the company showed that the Philadelphia Rapid Transit Company has property devoted to the transportation business in Philadelphia which the State authorities last year assessed for taxation at a value of $164,023,727. Out of gross receipts of $24,255,813 it last year paid taxes to city, State and nation of $1,903,662, or more than 7½ per cent of its gross receipts. It carries every day more than 1,500,000 passengers and it pays out every year in wages to its 10,750 employees more than $8,500,000. The city is a part owner of the property, for in addition to receiving each year $700,000 cash as taxes and on account of paving, a sinking fund is being built up out of the receipts of the company through which the city of Philadelphia will acquire the property of the company in 1957.

At the present time the loss from the jitney is estimated at not less than $3,000 a day, or at the rate of $1,000,000 a year. If continued, this loss can only be met by reducing wages or decreasing the number of cars operated. The company contends that if the jitney is to be operated it must be regulated, its routes should be ascertained, the fares to be paid should be fixed, the schedules should be maintained, congestion should be avoided, and those engaged in the business should not only pay their fair share of taxes through a proper license fee, but should also give a bond sufficient to insure a response in damages where accidents happen through their negligence. Mr. Mitten said that if it is felt that the best interests of Philadelphia require jitney competition in the transportation business then competition should be fair, as any unfair or wasteful competition can only do harm in the long run. At present the competition is unfair in respect to length of ride, in respect to regularity, in respect to responsibiilty for damages, and in respect to taxation.

The statement made by the company to the committee of the Councils is concluded in part as follows:

"All the company asks is a square deal. If you believe that the jitney should be licensed for the good of the community, then let the license be granted on such terms that the competition is fair. Let the jitney pay its fair proportion of taxes. Let it give assurances that it will respond in damages where accidents have happened. Let its routes be established and its schedules maintained in the lean hours as well as in the fat ones. In other words, make it a real business with real obligations to the public, and the Philadelphia Rapid Transit Company will then do its best to adjust its schedules and its business to the changed conditions."

The provisions of practically all the city ordinances included in the company's summary have been published previously in the ELECTRIC RAILWAY JOURNAL, but the table prepared by the company makes the data so convenient for reference that it is reproduced herewith.

City	Population 1910 Census	Date of Passage	Amount of Bond	Annual License Fee per Car
Arizona:				
Tucson	13,000	4- 5-15	$2,500	$30—up to 7 seats 60— 8 to 10 seats 80—11 to 20 seats
Arkansas:				
Little Rock	45,000	May, 1915	$2,000	$36—up to 7 seats 72— 8 to 12 seats 96—over 12 seats
California:				
Long Branch	17,000	10-27-14	$10,000	$25—up to 6 seats 30— 7 to 9 seats 35—10 to 15 seats 75—over 15 seats
Los Angeles	319,000	3- 4-15	$10,000	$60
Oakland	150,000	2-12-15	$10,000	[illegible]
Pasadena	30,000	11-21-14	$10,000	$30—up to 4 seats 35— 5 to 7 seats 45— 8 to 15 seats 55—16 to 29 seats 75—over 30 seats
San Francisco	417,000	May, 1915	$10,000	$10 to $40
Colorado:				
Denver	213,000	(Must obtain a city franchise)		
Pueblo	44,000	.....	$10,000	$50
Georgia:	On June 8, 1915, the Georgia Railroad Commission rendered a decision taking full supervision over jitney buses in the State.			
Atlanta	155,000	4-10-15	$5,000	$75—up to 4 seats 100— 5 to 7 seats 125— 8 to 9 seats 150—over 10 seats
Idaho:				
Boise	17,000	1915	$10,000 for two vehicles or less $20,000 for more than two vehicles	$75—up to 4 seats 100— 5 to 10 seats 150—10 to 20 seats
Illinois:	Illinois Public Utilities Commission has ruled that all jitneys must obtain a Certificate of Public Convenience.			
Kentucky:				
Louisville	224,000	4-22-15	$5,000	$10—up to 8 seats 20— 9 to 15 seats 25—over 15 seats
Louisiana:				
New Orleans	339,000	4-27-15	$5,000	Regular motor vehicle fee.
Nebraska:				
Lincoln	44,000	.....	$10,000	$25—up to 4 seats 30— 5 seats 35— 6 seats 40— 7 seats 50— 8 to 10 seats 75—11 to 20 seats 100—21 to 30 seats
New York:	New York State Law passed at 1915 session of the Legislature provides that no jitney shall operate until the owner has procured the consent of the local authorities and has executed a bond in an amount fixed by said local authorities.			
Buffalo	424,000	4- 7-15	$5,000 for one automobile $1,000 for each additional automobile	$75—up to 5 seats 100— 5 to 10 seats 150—over 10 seats
Schenectady	73,000	.....	$1,000 per seat Minimum $5,000	$5 per seat Minimum $25.
North Dakota:				
Fargo	14,000	4-16-15	$10,000 for not exceeding two vehicles	$50—up to 4 seats 75—over 5 seats
Ohio:				
Ashtabula	18,000	.....	$5,000	$100
Youngstown	79,000	.....	$5,000	$25
Oklahoma:				
Oklahoma City	64,000	2- 2-15	$10,000	$50—up to 8 seats 75— 9 to 12 seats 150—over 12 seats
Tulsa	18,000	.....	$5,000	$5 per seat. Maximum $20
Pennsylvania:	Pennsylvania State Law passed at 1915 session of the Legislature places jitney regulation under individual municipalities.			
Rhode Island:				
Providence	224,000	5-13-15	$500 per seat	$5 per seat Maximum $50
Tennessee:	Tennessee State Law passed April 1, 1915, defines a jitney as a common carrier and makes it unlawful for jitneys to operate without first obtaining from the municipality a license by ordinance and further provides that no such license shall be granted which does not require a bond of not less than $5,000, said bond to be executed to the State of Tennessee. The amount of the license fee is to be fixed by each municipality.			
Nashville	110,000	1915	$5,000	$60
Texas:				
Beaumont	21,000	2-19-15	$10,000	$20—up to 5 seats 30— 6 to 7 seats 5—per seat over 7
Dallas	92,000	4-21-15	$2,500	Not stated
El Paso	39,000	4-24-15	$5,000 for less than 6 vehicles; $10,000 for 6 and less than 11 vehicles; $15,000 for 11 or more vehicles	$18

City	Population 1910 Census	Date of Passage	Amount of Bond	Annual License Fee per Car
Texas (Continued):				
Ft. Worth.....	73,000	1915	$11,000	$10—up to 5 seats 20— 6 to 7 seats 30—over 7 seats
Port Arthur.....	7,000	2-13-15	$10,000	$7.20 per seat
San Antonio.....	97,000	1915	$10,000	$25—up to 7 seats $3.50 per seat over 7
Sherman.....	12,000	3- 5-15	$10,000	$10—up to 5 seats 20— 6 to 7 seats 30— 8 to 12 seats
Waco.....	26,000	3-22-15	$5,000	$25—up to 5 seats 5 per seat over 5
Utah:				
Ogden.....	25,000	4- 1-15	$10,000	$75—up to 5 seats 100— 6 to 10 seats 150—11 to 20 seats
Salt Lake City.....	92,000	3-24-15	$5,000	$75—up to 4 seats 100— 5 to 9 seats 125—over 10 seats
Washington:				
Seattle.....	237,000	1-17-15	$2,500	Not stated
West Virginia:				
Huntingdon.....	31,000	5-17-15	$5,000	$50—up to 4 seats 75—over 5 seats

STATE REGULATION OF JITNEY URGED

Counsel for the Pennsylvania Street Railway Association has asked the Public Service Commission to require jitneys to secure certificates of public convenience from the commission, post tariffs and schedules, as other common carriers are required to do and furnish $5,000 bonds for damages in case of accidents. The commission deferred consideration of the petition. In the course of the discussion, Commissioner Ainey remarked that if the jitney operators considered themselves common carriers they should post tariffs. This petition was presented by H. B. Gill, Philadelphia, counsel for the association, during the hearing by the commission on the protests of representatives of the Williamsport street railways against the incorporation of the Jitney Service Company, Williamsport. The Williamsport jitney people declared that the gross receipts from each car were $13 a day, while the cost was $8 a car daily. Counsel for the street railways contended that jitneys were soliciting street railway business and that they should not be permitted to parallel trolley routes which were set forth in charters and conducted by corporations under state regulation. One of the officials of the street railway system testified that the jitneys were impairing the credit of trolley companies and that there would either have to be a reduction of expenses, including salaries and wages, or an increase in suburban fares. C. L. S. Tingley, president of the association, said that the companies had made investments in good faith and having accepted regulation, ought to be protected. The commissioners asked numerous questions as to whether street cars were not frequently overcrowded and whether it would not be preferable to have jitney lines incorporated rather than have cars operated by individuals. Briefs will be filed later.

In New Orleans a temporary injunction has been granted preventing the enforcement of the ordinance regulating jitneys. The ordinance requires an indemnity bond of $5,000 from each jitney and provides for strict regulation. It also requires the New Orleans Railway & Light Company to file indemnity bonds for its 535 cars.

The Governor of California did not sign the bill for State regulation of the jitneys. He said that local conditions vary so much that no general State law could be made equitable, and that the control of the jitneys should remain subject to local regulation.

The Washington Water Power Company, Spokane, has been considering the operation of electrically driven jitneys to afford transportation in the districts beyond the ends of the car lines and cheap gasoline cars in the more congested sections of the city in competition with private jitney machines. The reason for using electrically driven vehicles in the outskirts and cheap gasoline cars in the downtown districts, Vice-President McCalla states, is because it is not believed that the downtown service will be a paying business for very long, but that there will probably be need for making the service permanent in the outlying districts. In some cases the electric machines will serve as feeders for the street cars to which they will transfer on a 5-cent fare. In other sections it is thought that it will be necessary to charge a 5-cent fare to the car lines and then the regular fare into the city. Mr. McCalla said that the matter had been studied very carefully, but he did not know how soon the plan would be carried out.

The United Railroads, San Francisco, Cal., has been keeping a tabulation of the number of jitneys in operation passing different points of the city. One such tabulation, made during a pleasant day in the early part of this month of the jitneys on Market Street passing Sixth Street from 6 a. m. to 1 a. m. the following morning showed that the average number of passengers per car was 2.88 and the average earnings per car mile was $0.0401.

Judge Pittman, of the Circuit Court of Tennessee at Memphis, has held the law providing for the regulation and bonding of jitneys, passed by the State Legislature, invalid. The chief point on which the law was declared unconstitutional was that it required the jitneys to file indemnity bonds and did not require these bonds for street cars or for other vehicles traversing the streets.

THE WASHINGTON AUTO BUS COMPANY

The Puget Sound Traction, Light & Power Company, Seattle, Wash., under the management of Stone & Webster and operating electric railways in Bellingham, Everett, Seattle and Tacoma, and interurban lines between Seattle and Tacoma, Seattle and Everett, and Mt. Vernon and Bellingham, has organized and incorporated the Washington Auto Bus Company, Stuart Building, Seattle, as noted previously in the ELECTRIC RAILWAY JOURNAL. The new corporation is capitalized at $25,000, and the trustees are the managers of the properties of the Puget Sound Traction, Light & Power Company in the four cities previously mentioned. K. K. Carrick, of the Pacific Northwest Traction Company, Everett, is active manager of the bus company. Other officers are: president, A. W. Leonard, president of the Puget Sound Traction, Light & Power Company; vice-president, W. H. McGrath, who holds a similar position with the Puget Sound Company; secretary-treasurer, F. P. Dexter, general accountant of the Puget Sound Company. As business of the company advances and extensions are made, company managers in various territories will have local direction in their individual districts. The business of the Tacoma district will be cared for by L. H. Bean, manager of the Tacoma Railway & Power Company; Seattle District by A. L. Kempster, of the Puget Sound Traction, Light & Power Company; Everett territory by D. C. Barnes, manager of the Pacific Northwest Traction Company, and Bellingham section by L. R. Coffin, manager of the Whatcom County Railway, Light & Power Company.

The company began operating on June 1. The nature of the service is passenger transportation, and the run is from Buckley and Enumclaw to Auburn, a distance of 21 miles, making connections at the latter place with the interurban trains of the Puget Sound Electric Railway. The initial schedule calls for two buses, and a third is used for a stand-by. Flat fares are charged as follows: between Tacoma and Buckley, or Enumclaw, one way, 90 cents; round trip, $1.50; between Seattle and Buckley, or Enumclaw, one way, $1.25; round trip, $2.10, with stop-over privileges at Auburn. A joint ticket is sold covering a ride on the bus between Buckley or Enumclaw, or Auburn, and Seattle and Tacoma, on the Puget Sound Electric Railway. No transfers are given to the local railway lines. The machines in use on this line are Studebaker cars, carrying bodies built in Seattle, with seats for twelve passengers.

The company also plans to institute service at once between Edmonds and Seattle Heights, where connections will be made with the interurban trains of the Pacific Northwest Traction Company and the Seattle-Everett line for Seattle or Everett. Operations on this line will begin with a Studebaker car, carrying a body constructed in Seattle, with seating capacity of nine passengers. Flat fares will also be charged on this line, and no transfers will be issued to the local railway lines. A joint ticket, however, will be sold similar to the one referred to above. Three Mack machines, with bodies constructed by The J. G. Brill Company, have been ordered, and will be placed in service as soon as the cars are ready. They are expected to be delivered in July. Each of these machines will seat twenty passengers. The route for these cars has not been selected. The Washington Auto Bus Company is the direct result of an effort on the part of the Puget Sound Traction, Light & Power Company to increase the patronage of its interurban lines in the Puget Sound country.

RULES FOR JITNEYS

Public Service Commission of Maryland Prescribes Rules for Jitney Operation

Some time ago W. Cabell Bruce, general counsel to the Public Service Commission of Maryland, rendered an opinion to the commission holding that jitneys are common carriers and as such are under the jurisdiction of the commission. As a result the commission ordered all jitney owners to register with it by June 1. The commission has now announced effective at once rules designed to insure the safety, adequacy and dependability of jitney service. In promulgating its rules the commission said:

"Upon proper registration, the owner or owners will be furnished with an identification card, one for each vehicle, whether in actual operation or held in reserve. Such card will give the name and address of owner or owners; the license number issued by the commissioner of motor vehicles; the maximum numbers of persons each vehicle shall be permitted to carry at any time; the definite route to be traveled, and the schedule of operation to be maintained.

"Each such public bus shall follow such route, and maintain such schedule, under the provision of Circular No. 41 (providing for the reporting of the commission of 'interruptions to service') to the same effect and in the same manner as said Circular No. 41 is applicable to electric railways.

"The identification card shall be carried by the operator of the public bus, upon the vehicle itself, and shall always be presented for inspection upon the demand of an authorized representative of the commission, or other legally constituted authority. Failure to produce said card shall subject the owner to the penalty set out in Circular No. 40.

"If, in the opinion of the commissions, any public bus fails to render satisfactory service, or is operated under such conditions as to render such services inadequate, unsafe or improper, the registration of such public bus shall be annulled and further operation prohibited.

"All the provisions of Circular No. 3-B in respect to 'accidents' shall be applicable to public buses to the same extent that they are applicable to electric railways, and to such further conditions as may be imposed by any revision or revisions of said Circular No. 3-B.

"Each public bus shall be provided with an indicator, upon which all fares collected shall be registered, showing both the fares collected during the current trip and also the total fares collected. A permanent record shall be kept of the total fares collected during each tour of duty of each public bus, giving the index of the register when first starting out, and the index at the completion of the tour of duty.

"Violations of existing laws or of street traffic regulations will, in the discretion of the commission, cause annulment of registration.

"Public buses shall adhere, as closely as practicable, to the established routes and schedules, and any departure therefrom must be reported to the commission."

The rules then state that not more than one person shall be allowed to occupy the front seat of a bus, in addition to the driver; that no one shall be allowed to ride upon the top of a bus, unless it be constructed for that purpose and be provided with seats and protective railings; that schedules of rates shall be filed with the commission before becoming effective; that the commission reserves the right to arrange or re-arrange routes and schedules to prevent unnecessary congestion on streets, and that sufficient reserve equipment shall be kept in good condition to insure maintenance of the established routes and schedules.

The commission, in conclusion, prescribes the following rule as to the maximum load:

"The maximum number of persons each vehicle shall be permitted to carry at any one time, and which carrying capacity shall be designated on the identification card when issued, shall be based upon the following rating, this rating being based upon the total length of seats in inches, allowing 16 in. per passenger when such number so designated does not exceed the carrying capacity of the chassis, allowing an average of 140 lb. per passenger:

Total length seats.....	128	140	160	176	192	208	224	240
Pounds capacity.....	1120	1260	1400	1540	1680	1820	1960	2150
No. passengers	8	9	10	11	12	13	14	15

MILWAUKEE FARE DECISION

The United States Supreme Court has affirmed the decision of the Wisconsin Supreme Court of May 29, 1913, which in turn affirmed the order made by the State Railroad Commission of Wisconsin in August, 1912, requiring the company to sell tickets in packages of thirteen for 50 cents instead of twenty-five for $1 as provided in an ordinance and accepted by the company in January, 1900.

The point at issue was whether the municipality had power to make a contract with the railway covering a term of years for a specified rate of fare, and the opinion upholds the Wisconsin Court in denying this right. According to President Mortimer of the Milwaukee Electric Railway & Light Company the case will now go back to the lower courts on the question of the reasonableness of the original order, and possibly also to the Railroad Commission of Wisconsin, and the company hopes to prove its case. While the question was before the courts, beginning in October, 1912, and up to last February, the company has been giving coupons as receipts for the excess fare charged. In view of the decision of the commission last January, reported on page 333 of the issue of this paper for Feb. 13, it is thought that the plea of the company as regards the unreasonableness of the fare charged will be favorably received.

Increase in Fare Suspended.—Public Service Commission of Massachusetts has further suspended until July 15 the proposed increase in the unit passenger fare on the Blue Hill Street Railway.

Re-hearing in Suburban Fare Case.—The Public Service Commission of Pennsylvania has denied the application of Philadelphia commuters for a rehearing in the commutation case involving fares over the lines of the Pennsylvania Railroad and Philadelphia & Reading Railway out of Philadelphia.

Lake Shore Electric on Standard Time.—Cars on the Lake Shore Electric Railway between Cleveland and Detroit are now being operated on Eastern standard time. This was done because of the adoption of Eastern time in Detroit recently. Cleveland has had Eastern time for a year or more.

Wage Adjustment.—The representatives of the trainmen in the employ of the Shore Line Electric Railway, Norwich, Conn., and the officers of the company have agreed upon an advance in wages from a minimum of 22 cents an hour and a maximum of 28½ cents to a minimum of 23 cents and a maximum of 29 cents.

Wage Conference in Rhode Island.—A. E. Potter, president of the Rhode Island Company, Providence, R. I., will confer with a committee representing the employees of the company in regard to new working conditions. On June 17 the representatives of the men were empowered by vote to call a strike of the employees.

Increase in Fare Asked.—Following an appeal made by George A. Stanley, president of the New York & North Shore Traction Company, Roslyn, N. Y., the Board of Trade of Port Washington has sent a communication to the Public Service Commission for the Second District favoring a 15-cent fare between Port Washington and Mineola, providing the claims made by Mr. Stanley regarding the inadequacy of the present fare are found to be correct.

Experimental Week-End Excursion Rate.—An amendment has been filed with the Public Service Commission to Puget Sound Electric Railway Experimental Tariff No. 6 covering passenger rates, which became effective on June 1, 1914, naming an experimental week-end excursion rate between Tacoma and Seattle of 75 cents for the round trip, effective on June 19. Tickets will be good for use on Saturdays and Sundays only during the months of June, July and August.

Complaint Against Jersey City Service Dismissed.—The Board of Public Utility Commissioners of New Jersey has dismissed the complaint of Jersey City against the Public Service Railway. The action related to the adequacy of service furnished. The commission said in part: "In this situation no useful purpose will be served by continuing

the consideration of the present proceeding, which is general in its scope and relates, in part, to conditions which have in the meantime been materially changed. Further consideration in the present proceeding will, therefore, be suspended and the matter taken from the board's conference list."

Wage Negotiations in Toronto.—The offer of the Toronto (Ont.) Railway to its employees to renew the agreement fixing the scale of wages at the present rate for a further period of three years has been rejected by the men. The latter have signified their willingness to withdraw the demand recently made for an increase of 2½ cents an hour and to consent to a renewal of the present agreement for two years. The suggestion of the men will be considered by the company upon the return of R. J. Fleming, general manager, to the city.

Complaint Against Scranton Railway Dismissed.—The Public Service Commission of Pennsylvania has dismissed the complaint filed with the commission against the city of Scranton to compel the Scranton Railway to accept an ordinance passed by the City Council requiring the company to extend its system upon certain streets. The commission held that the necessity for the establishment of the route covered by the proposed extension was not such as to justify it in compelling the company to make the extension and further that the public service company law did not authorize the commission to compel a public service company to extend its facilities beyond the territory covered by its charter or amendments thereto.

Suspension of Smoking Order for Summer.—On the application of the companies of the Brooklyn Rapid Transit system and the New York Railways, the Public Service Commission for the First District has adopted resolutions suspending for the summer months the orders forbidding smoking on the convertible cars of the Brooklyn system and the low-level center-entrance cars of the New York Railways. Under the suspension smoking will be allowed upon the four rear seats of the convertible cars in Brooklyn and upon the two rear seats and the circular seat in the rear of the low-level center-entrance cars of the New York Railways system. Action upon the Interborough Rapid Transit Company's application for permission to allow smoking on the open cars of the Third Avenue elevated railroad has been deferred.

Albany Wage Negotiations.—The demands of the employees on the Albany and Troy division of the United Traction Company, Albany, N. Y., that they shall have control of runs over the Hudson Valley Railway from Waterford into Troy has resulted in a temporary suspension of the negotiations looking toward the adjustment of the working conditions on the United Traction Company's lines before July 1, on which date the present agreement between the company and its employees expires. It is stated that about thirty motormen on the Hudson Valley Railway are members of the Brotherhood of Locomotive Engineers and that conductors to the number of thirty are members of the Order of Railway Conductors. The question of union jurisdiction has therefore arisen. C. F. Hewitt, general manager of the United Traction Company, threw the conference between the representatives of the company and the union open to the newspaper men.

New Advertising Policy in Brooklyn.—On June 17 a new policy was inaugurated for the benefit of all advertisers and consumers using the Brooklyn Rapid Transit System. On that date the Broadway Subway & Home Boroughs Car Advertising Company, Inc., which now controls the advertising privileges on the Brooklyn Rapid Transit System, began using the news and vending stands for furthering and exploiting all of the wares advertised in the cars and on the stations of the system by making it possible for consumers impressed with advertising in the cars or stations to order advertised goods by slip through the company. Any possible antagonism of the large or small storekeepers of Brooklyn has been guarded against by an arrangement for a suggested system of credits to the store carrying the goods nearest to the ultimate consumer. The plan is to make it possible for the consumer to secure the advertised product at once with the least possible inconvenience to himself.

Personal Mention

Mr. Julian M. Bamberger, vice-president and general manager of the Salt Lake & Ogden Railway, Salt Lake City, Utah, has been elected president of the company.

Mr. F. R. Southard has been appointed purchasing agent of the United Railroads, San Francisco, Cal. In addition to his new duties, he will continue to act in the capacity of storekeeper.

Mr. R. W. Crook, general manager of the People's Railway, Wilmington, Del., which has been absorbed by the Wilmington & Philadelphia Traction Company, was recently presented with a diamond pin by the employees of the People's Railway as a token of their esteem.

Mr. S. T. Henry, second vice-president of the McGraw Publishing Company, Inc., and formerly Western editor of the *Engineering Record*, has been appointed by Secretary of the Treasury McAdoo a member of the committee of the Pan-American Financial Conference which will have charge of the visits of American bankers and business men to Central and South American countries.

Mr. H. T. Matthew has been appointed Pacific Coast representative for the Society for Electrical Development. Mr. Matthew for six years beginning in 1901 was business manager of *Electrochemical Industry* (now *Metallurgical & Chemical Engineering*), one of the McGraw papers, and later was western manager for *Electrical World*. For the past three years he has represented the McGraw publications on the Pacific Coast.

Mr. L. F. Rye has been appointed auditor of the Kentucky Traction & Terminal Company, Lexington, Ky., to succeed Mr. G. L. Langton. Mr. Rye was formerly connected with the Detroit (Mich.) Edison Company as assistant general accountant. He was with the company for five years, entering its employ as chief clerk. Previous to that he was auditor of the Watt Motor Car Company, Detroit, for a year and a half and prior to that was chief clerk of the Detroit & Suburban Gas Company for a year. He also served as head bookkeeper of the Citizens' Gas & Electric Company, Waterloo, Ia., for two years.

Mr. Horace Field Parshall, formerly chairman of the Central London Underground Railway, London, England, will hereafter have charge of the physical property of the Barcelona Traction Light & Power Company, Barcelona, Spain, as a result of changes in the administration of the company following the recent death of Dr. F. S. Pearson. Mr. Parshall is an American, but has been in England about twenty years. He was electrical engineer for the Dublin Tramways, the Glasgow Tramways, the London United Tramways and the Bristol Tramways, and has been connected with many other large electrical projects in Great Britain. He prepared the plans for the Central London Underground Railway installation, the first railway in England to be operated on the multi-phase system with converting substation, and was associated with the work on the Central London Underground Railway for more than ten years.

OBITUARY

Richard S. Brown died on June 5 in New York City. Mr. Brown was born in Great Barrington, Mass., seventy-six years ago. He became connected with the Belt Railway in New York and subsequently joined the Daft Company in its early electric railway work. In 1890 he entered the service of the Westinghouse Electric & Manufacturing Company, continuing with that company until the end. Practically his entire period of service was spent as a salesman for railway apparatus at the Boston office.

Dr. Emil Rathenau, founder of the German Edison Company and for many years managing director of its successor, the Allgemeine Elektricitäts Gesellschaft, Berlin, is reported dead at the German capital in a dispatch from that city by transatlantic wireless, June 21. Dr. Rathenau in recognition of his work in organizing the electrical industry of Germany had been the recipient of many honors from Emperor William, the German government, the universities and engineering schools, and leading commercial engineering organizations.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Calhoun County Railway, Pearl, Ill.**—Chartered in Illinois to build a railway from Pearl to Golden Eagle. Capital stock, $2,500. John E. Melick, Kampsville, is interested.

FRANCHISES

***Birmingham, Ala.**—W. W. Shortridge, Birmingham, and associates have asked the Council for a franchise to construct an electric railway from the city limits of Birmingham to the Warrior River.

Aurora, Ill.—The Aurora, Mendota & Western Traction Company has received from the Council of Aurora a twenty-five-year franchise to construct a line through the city. The franchise gives the company the right to operate its cars from the north side of Benton Street along Broadway and across intersecting streets to the southerly limits of the city. This is part of a plan to build a railway from Aurora to Montgomery. It is proposed to extend later the line south through Princeton to connect with the Illinois Traction System. Upshaw Hord, Aurora, is interested. [April 10, '15.]

Evansville, Ind.—The Public Utilities Company has received a franchise from the Council to extend its Main Street line on Morgan Avenue to Heidelbach Avenue, Evansville.

Hutchinson, Kan.—The Hutchinson Interurban Railway has asked the Council for a franchise to extend its line on Second Street from Main Street to Walnut Street.

Revere, Mass.—The Bay State Street Railway has asked the Council of Revere for a franchise to alter and relocate its tracks on Revere Street between Pierce Street and Bellevue Street.

Youngstown, Ohio.—The Lake Erie & Youngstown Railroad has received from the Public Utilities Commission of Ohio an extension of time within which to complete its line from Conneaut to Youngstown. [May 8, '15.]

Pottsville, Pa.—The Schuylkill Electric Railway, which is controlled by the Eastern Pennsylvania Railway, has received a franchise from the Council to construct a railway over Broad Mountain, which separates northern and southern Schuylkill County.

TRACK AND ROADWAY

***Huntsville, Ark.**—It is reported that a stock company has been organized to build an interurban railway from Huntsville to a connection with the St. Louis & San Francisco Railroad, 15 or 20 miles.

Tidewater Southern Railway, Stockton, Cal.—Work has been begun by this company on the extension of its line from Modesto to Turlock. Grading and construction south of the Tuolumne River has been begun and a bridge will be constructed across the Tuolumne River. It is expected that trains will be operated over the new extension in about four months.

Connecticut Company, New Haven, Conn.—Extensive improvements in Hartford are being planned by this company to be carried out this summer. Double tracks will be laid on Wethersfield Avenue from Wyllys Street to Bond Street. The track on Fairfield Avenue will be changed from the side to the middle of the street. The tracks on Main Street will probably be replaced with new track from South Green Street to a point near Pearl Street. A number of other improvements are also being considered. Double tracks are also being laid on Elizabeth Street from Main Street to Third Street, New Haven.

Waycross Street & Suburban Railway, Waycross, Ga.—Work has been begun by this company on the construction of its Lincoln Street line to Gilchrist Park. Material is being placed for the extension as fast as it is brought from the Gilmore Street line, which is being removed. The Gilmore Street line will be transferred to Lee Avenue, from which street the railway will go through Gilchrist Park. The Lincoln Street line connects with the old Gilmore Street line at Screven Avenue.

***Bloomington, Ill.**—Residents of Stevensonville, a suburb of Bloomington, are working with members of the City Commission to secure an electric line to their part of the city. A loop system by which the West Washington and Miller Park lines of the Bloomington Street Railway can connect with a line through Stevensonville is proposed. Commissioner A. G. Erickson is trying to interest the Bloomington & Normal Railway & Light Company in the project.

Illinois Traction System, Peoria, Ill.—Officials of this company have been asked by the Mayor and the Commercial Club of Jefferson City, Mo., to build an interurban line from Jefferson City to Columbia, Mo., 35 miles.

Union Traction Company, Coffeyville, Kan.—This company is repairing its track on Eighth Street, east of Union Street. New ties are being laid and the roadbed being made more solid. Similar improvements have been made by the company on other streets traversed by its different lines.

***Lebanon, Ky.**—Right-of-way for an electric line from Lebanon to Smithville has been secured from John W. Overall by Charles Edwards, representing White & Company, Chicago. It is stated that the proposed railway will connect with the Nashville, Chattanooga & St. Louis Railway at Lebanon, which will later be electrified.

Louisville (Ky.) Railway.—This company reports that work has been begun on its 1.8-mile double-track extension from Twenty-seventh Street and Chestnut Street to Shawnee Park, via Madison Avenue, Louisville. The construction consists of Lorain Steel Company's 103-lb., No. 426 rail on wooden ties, 2 ft. centers, with crushed-rock foundation to the bottom of the ties, concrete being used on top for paving.

***Alexandria, La.**—Plans are being considered to build an electric railway in Alexandria. T. T. Constant, Alexandria, is interested.

Shreveport (La.) Railways.—This company has completed its extension from Shreveport to South Highlands. Heavy rails have been laid on creosoted ties and the track has been ballasted with broken rock.

***Skowhegan & Athens Electric Railroad, Athens, Maine.**—Plans are being considered to build an electric railway from Skowhegan to Athens, via East Madison and North Cornville, 12 miles. The line will connect with the Maine Central Railroad and the Skowhegan & Madison Electric Railway at Skowhegan. Subscriptions to the amount of $80,000 have been pledged, leaving $20,000 still to be raised, as the entire sum required to insure the road being built is $100,000. H. E. Trueworthy, George F. Ayer and James Chapman, Athens, are interested.

Sandy Springs Railway, Kensington, Md.—This company reports that construction has been begun on an extension of its lines in Kensington.

Bay State Street Railway, Boston, Mass.—Work has been begun installing new rails on both the northbound and southbound tracks on North Main Street, Fall River, from the carhouse south to Bank Street. The old 6-in. rail is being replaced with 9-in. rail.

Detroit (Mich.) United Railway.—Grading has been completed on this company's extension to Imlay City and the work of laying track will be begun at once.

Twin City Rapid Transit Company, Minneapolis, Minn.—This company contemplates track extensions and rehabilitation amounting to approximately 20 miles of single track. This work will include new overhead construction and track laid with crushed stone and gravel ballast, treated hemlock ties, 7-in., 91-lb. T-rail and granite-block pavement.

***Kansas City, Mo.**—D. M. Proctor and associates plan to construct an electric railway in Kansas City.

Metropolitan Street Railway, Kansas City, Mo.—This company is laying new tracks on Woodland Avenue between Missouri Avenue and Tenth Street, Kansas City.

Springfield (Mo.) Traction Company.—The track on this company's Chadwick Street line as far as Sequiota Park has been raised 2 in. above the former level. Heavier rails and new ties have been laid.

Missoula (Mont.) Street Railway.—Work has been begun by this company on the construction of an extension of its Daly Addition line to the county fairgrounds.

Trenton, Lakewood & Seacoast Railway, Trenton, N. J.—This company has been authorized by the Board of Public Utility Commissioners of New Jersey to issue $190,000 of 5 per cent, first mortgage bonds and $85,000 of capital stock for the completion of the construction and equipment of its line between Lakewood and Point Pleasant. Rails, ties, poles and other construction material have been ordered and construction will be begun at once under the direction of Roy C. Havens, constructing engineer. George O. Vanderbilt, Trenton, is interested. [May 29, '15.]

Brooklyn (N. Y.) Rapid Transit Company.—The Public Service Commission for the First District of New York has authorized the chairman and secretary to advertise for bids, to be opened Friday, July 9, at 12:15 p. m., for the installation of tracks on the New Utrecht Avenue elevated line. This line is a branch of the Fourth Avenue subway, extending from Fourth Avenue through Thirty-eighth Street in an open cut to New Utrecht Avenue, and thence over New Utrecht Avenue, Eighty-sixth Street and Stillwell Avenue as an elevated line to Coney Island. It will be operated by the New York Consolidated Railroad Company (Brooklyn Rapid Transit) in connection with the Fourth Avenue subway. As the city has arranged for the purchase of rails, ties and other track materials, the contractor will be required only to do the work of installing the tracks and switches. Operation was begun on June 22 on this company's new Fourth Avenue subway, Brooklyn, from Chambers Street, New York, to Coney Island, Brooklyn.

Interborough Rapid Transit Company, New York, N. Y.—The Public Service Commission for the First District of New York has awarded the contract for the construction of Section No. 1 of Route No. 29, the Nostrand Avenue subway in Brooklyn, to Newman & Carey Company, Brooklyn, for $2,073,303.20. The Nostrand Avenue subway is a branch of the Eastern Parkway subway, which in turn is an extension of the existing subway, and will be operated in connection therewith by the Interborough Rapid Transit Company. Section No. 1 covers that part of the line extending from Eastern Parkway southward under Nostrand Avenue to a point about 220 ft. south of Church Avenue. The contract must be completed within twenty-one months, and the contractor gives a bond of $200,000. On June 22 the company placed in operation the line under the East River from Forty-second Street, Manhattan, to Jackson and Van Alst Avenues, Long Island City, known as the Steinway tunnel.

***Troy, N. Y.**—Plans are being considered by the Troy Chamber of Commerce for the construction of an electric railway from Rensselaer to Troy.

Alamance, Durham & Orange Railway & Electric Company, Burlington, N. C.—Burlington has voted to issue $100,000 to aid in the construction of this company's line from Ossippee to Durham. Junius Harden, Burlington, is interested. [March 20, '15.]

Cincinnati (Ohio) Traction Company.—This company has been ordered to lay tracks across the Mohawk Bridge and to divert its Westwood and College Hill cars via that route. This is in accordance with an ordinance passed by the Council of Cincinnati in February, 1913.

Reading Transit & Light Company, Reading, Pa.—This company is laying new track on its line on Perkiomen Avenue between Thirteenth Street and Nineteen-and-One-Half Street, Reading.

Rhode Island Company, Providence, R. I.—Plans are being made by this company to install new 9-in. grooved girder rails in Clinton Street and South Main Street, Woonsocket. The company will also replace its present tracks in Providence Street with T-rails taken up in South Main Street.

Chattanooga Railway & Light Company, Chattanooga, Tenn.—Operation of the Lookout Mountain incline railway of this company has been suspended to permit replacing of the cables which are used in handling the cars. Two new steel cables are being put in place, each 5000 ft. long. The old cables have been in service more than two years.

Carolina, Greenville & Northern Railroad, Greenville, Tenn.—Work has been begun on the construction of this company's line to be built between Knoxville and Bristol. Construction is now in progress at Rader's, Washington County, and the line is being built eastward to Kingsport. Engineers are locating the route for the section of the road between Kingsport and Bristol. An option has been taken on the lines of the Bristol Traction Company, and representatives of the company are in Sullivan County looking after terminal sites and soliciting subscriptions to a fund of $75,000 to be used in obtaining rights-of-way, terminal sites, etc. The new line will connect the Norfolk & Western Railway, the Louisville & Nashville Railroad and the Carolina, Clinchfield & Ohio Railway. The connecting railroads will haul trains over the new road under steam power. Arrangements have been made to float a bond issue of $5,000,000 for the construction of the line, and counties along the line will be offered the securities to the extent of 7½ per cent to 10 per cent of the amount to be expended in those counties. H. S. Reed, 205 Grant Building, Los Angeles, president. [April 17, '15.]

Nashville (Tenn.) Traction Company.—Operation has been begun on this company's 3-mile extension from the corner of Fifth Avenue and Church Street, Nashville, south on Fifth Avenue to Mulberry Street, thence to Second Avenue, thence to Lafayette Street, extending to the present terminus of the line on Murphreesboro Pike.

Charleston (W. Va.) Interurban Railroad.—A report from this company states that it expects to build an extension from Charleston to Cabin Creek Junction, 13.5 miles.

SHOPS AND BUILDINGS

Metropolitan Street Railway, Kansas City, Mo.—Plans are being considered by this company to construct an ornamental shelter house 46 ft. by 12 ft., on the east side of the street car tracks south of the Main Street viaduct for persons waiting for street cars at the Union Station. It is to contain no benches or concession stands, but is to be only a shelter from the elements. The proposed site is now occupied by a raised platform of concrete, an island of safety. The cost is estimated at $2,000.

Slate Belt Electric Street Railway, Pen Argyl, Pa.—This company plans to remove its carhouse and powerhouse from Pen Argyl to Wind Gap. The new carhouse will be 175 ft. x 57 ft., one story, fireproof, brick construction. It will contain the offices of the company and a room for the employees, modernly equipped for their comfort. It is expected that the new carhouse will be ready for use by the fall. The cost is estimated to be $12,000. The Pen Argyl property has been offered for sale.

POWER HOUSES AND SUBSTATIONS

Toledo Railways & Light Company, Toledo, Ohio.—This company will install one 1500-kw., 600-volt d. c., six-phase, twenty-five-cycle, 500-r.p.m. compound-wound commutating pole rotary converter and three 500-kva., single-phase, twenty-five-cycle, 2300-volt high-tension to rotary voltage low-tension, O. I. W. C. transformers. The contract for this apparatus has been placed with the Westinghouse Electric & Manufacturing Company.

Johnstown (Pa.) Traction Company.—A contract has been placed with the Westinghouse Electric & Manufacturing Company by this company for one 300-kw., 600-volt, d. c., three-phase, sixty-cycle, 1200-r.p.m. compound-wound, a. c., self-starting rotary converter; one 300-kva., three-phase, sixty-cycle, 22,000-volt high-tension to rotary voltage low-tension, O. I. S. C. transformer and one two-panel switchboard for the control of same.

Montreal & Southern Counties Railway, Montreal, Que.—This company reports that it plans to construct a substation at Granby, and expects to purchase a generator, switchboard and apparatus to be installed therein.

Ogden, Logan & Idaho Railway, Ogden, Utah.—This company is erecting a substation at Hot Springs. The building may also be used as a passenger station. The cost is estimated to be $4,000.

Charleston (W. Va.) Interurban Railroad.—A report from this company states that it expects to build one 1200-volt substation and three 600-volt substations.

Manufactures and Supplies

ROLLING STOCK

Peoria (Ill.) Railway is contemplating the purchase of ten additional city cars.

Ogden, Logan & Idaho Railway, Ogden, Utah, is reported as having ordered six new trailers for its Ogden-Preston line.

Lake Shore Electric Railway, Cleveland, Ohio, has purchased three interurban cars from the Jewett Car Company.

Charleston Interurban Railroad, Charleston, W. Va., expects to purchase four interurban cars and one combination express and locomotive car, 300 hp.

Detroit United Railway, Detroit, Mich., has ordered fifty trail cars and twenty-five motor cars of the center entrance type from the G. C. Kuhlman Car Company.

Southern Traction & Power Company, Alexandria, La., in an unconfirmed report is said to have been purchased by the city of Alexandria, which will obtain several new cars.

Manhattan & Queens Traction Corporation, New York, N. Y., noted in the ELECTRIC RAILWAY JOURNAL of May 1, 1915, as considering the purchase of ten new cars through H. L. Doherty & Company, New York, has decided to postpone indefinitely the ordering of these cars.

United Traction Company, Albany, N. Y., has been ordered by the Public Service Commission of New York, Second District, to comply immediately with its order requiring the railway to purchase forty new cars or submit on or before July 6 an alternative plan of improving its present equipment.

TRADE NOTES

International Register Company, Chicago, Ill., states that after an extended test the Omaha & Council Bluffs Street Railway has purchased twenty International coin registers, type C 15.

Rail Joint Company, New York, N. Y., received a grand prize, the only medal of honor awarded for rail joint products in the transportation department by the Panama-Pacific International Exposition at San Francisco.

Union Switch & Signal Company, Swissvale, Pa., is completing an installation of interlocking signals at the crossing of the Newark-Trenton high-speed line of the Public Service Railway with the tracks of the Standard Oil Company, near Bay Way, N. J.

H. M. Byllesby & Company, Chicago, Ill., announce that their department of examination and reports, in the course of thirteen years' experience, has made commercial reports for public utility interests in every State in the Union, and in Canada and Mexico. It connection with these reports it has appraised property worth more than $300,000,000.

Edward T. Sharp, Buffalo, N. Y., who owns the patent rights for the Ideal trolley wheel, and who has been in charge of that department of the Lumen Bearing Company for the past fifteen years, has purchased the patents, tool and equipment used by this company in the manufacture of trolley wheels and on July 1 will take over this part of the company's business and manufacture and sell the Ideal wheel under his own name. Mr. Sharp's offices are located at 56-58 Indiana Street.

Western Electric Company, New York, N. Y., on June 5 received a visit from the Honorary Commercial Commissioners of China, who are in the United States for an extended tour of inspection of the commercial activities of this country. On that occasion they inspected the cable shop, powerhouse, general merchandise building, and telephone apparatus shop. The distinguished visitors were treated to an electrically cooked luncheon, after which they were taken to the Dey Street building of the American Telephone & Telegraph Company, where a telephone connection was established between that building and one of the company's exhibits at the Panama-Pacific International Exposition.

Harvey Company, Baltimore, Md., has been incorporated for the purpose of selling railroad supplies and equipment. Arrangements will be made for representing the pirncipal manufacturers of the country and thereby giving customers the benefit of quick shipments, either direct from mill or stock at the warehouse in Baltimore. In addition to the office and warehouse, which will be at 113 South Street, a storage yard will be maintained at Curtis Bay, Md., on the Baltimore & Ohio Railroad track, where facilities will be arranged for the storage of contractor's engines, cars, etc. J. Edward Harvey, president of the company, was formerly the president of the South Baltimore Steel Car & Foundry Company, and was also connected as proprietor of the Eastern Railway Supply Company.

ADVERTISING LITERATURE

Ohmer Fare Register Company, Dayton, Ohio, has issued a folder on its totalizing fare register system.

Davis-Bournonville Company, Jersey City, N. J., has issued a special Panama-Pacific International Exposition number of its publication *Autogenous Welding*, which describes the company's exhibit at the Exposition of oxy-acetylene apparatus for light and heavy welding and cutting in connection with car and boiler repairs and for use in iron and steel foundries.

Trussed Concrete Steel Company, Detroit, Mich., has issued the thirteenth edition of its comprehensive Hy-Rib handbook. This publication embraces all the information in previous editions and includes a number of additions. The photographs of installations are particularly comprehensive, including many new applications, among which are views of applications made on the repair shops of the Louisville (Ky.) Railway and the New York, Westchester & Boston Railway. Illustrations and information on pressed steel studs and Kahn pressed steel construction, as well as the floretyle construction, have been added.

R. D. Nuttall Company, Pittsburgh, Pa., has issued Catalog No. 13 covering electric railway gears, pinions and trolleys. This publication gives general data on Nuttall railway motor gearing for Westinghouse and General Electric equipments, Nuttall trolleys, harps and wheels, flexible couplings of the spring and buffer type, and electric railway compressor gears. This company has also issued Catalog No. 12 on mine and industrial gears, pinions and trolleys. This publication covers mine haulage locomotive gears, pinions and trolleys, mining machine gearing, mine haulage and general data for ordering industrial gears.

Railway & Industrial Engineering Company, Pittsburgh, Pa., has issued a reprint of an article by Lester C. Hart, general manager of the company, entitled "The Field of the Out-door Substations," which appeared in the *Electric Journal*. The reprint traces in an interesting way the development of the out-door substation stimulated by the facts of the heavy cost and losses of long line and the prohibitive additional cost of indoor substations. Among the main advantages claimed for the outdoor substation are its saving in the initial cost by omitting the building, its adaptability for enlargements or alterations and its simplicity. The article contains illustrations of typical installations of this character, under varying topographical conditions.

Weber Chimney Company, Chicago, Ill., has issued a new catalog for 1915 illustrating its reinforced concrete chimneys, among the illustrations being a view of the power house of the Havana Electric Railway, Light & Power Company, Havana, Cuba, where these chimneys are installed. The catalog also contains a list of users numbering nearly 1000 throughout the United States and other countries in which the names of the following electric railways appear: Capitol Traction Company, Chicago (Ill.) Railways, Illinois Traction System, Marquette Gas & Traction Company, Jackson Electric Railway & Light Company, Laurel Light & Railway Company, Meridian Light & Railway Company, City Railway, Portland Railway & Light Company, Nashville Railway & Light Company, Utah Light & Railway Company, British Columbia Electric Railway, Havana Electric Railway, Light & Power Company. At the end of the catalog is a table of chimney sizes for steam boilers of varying horsepower.

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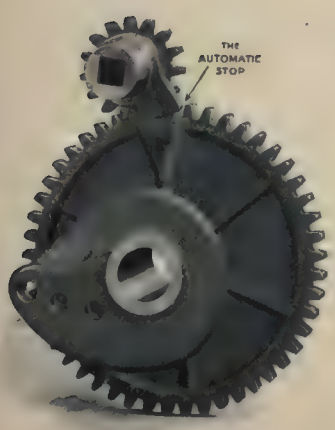

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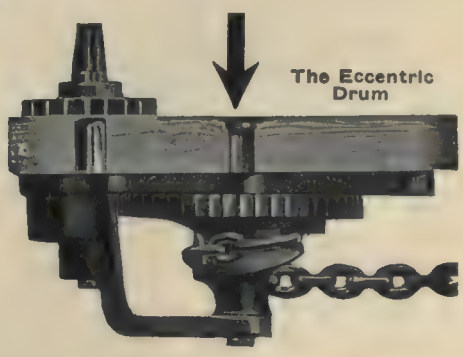

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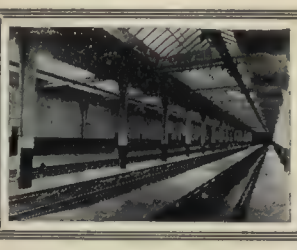

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The Association will, this year, provide no exhibit facilities for manufacturers. Therefore, the advertising pages of the Journal's Convention Number will take the place of the usual Convention exhibit space. Make your plans early.

Unless you have an exhibit at the Panama-Pacific Exposition, this will be your one opportunity to bring your products forcefully to the attention of Convention delegates and visitors, as well as to those railway men who do not attend the Convention.

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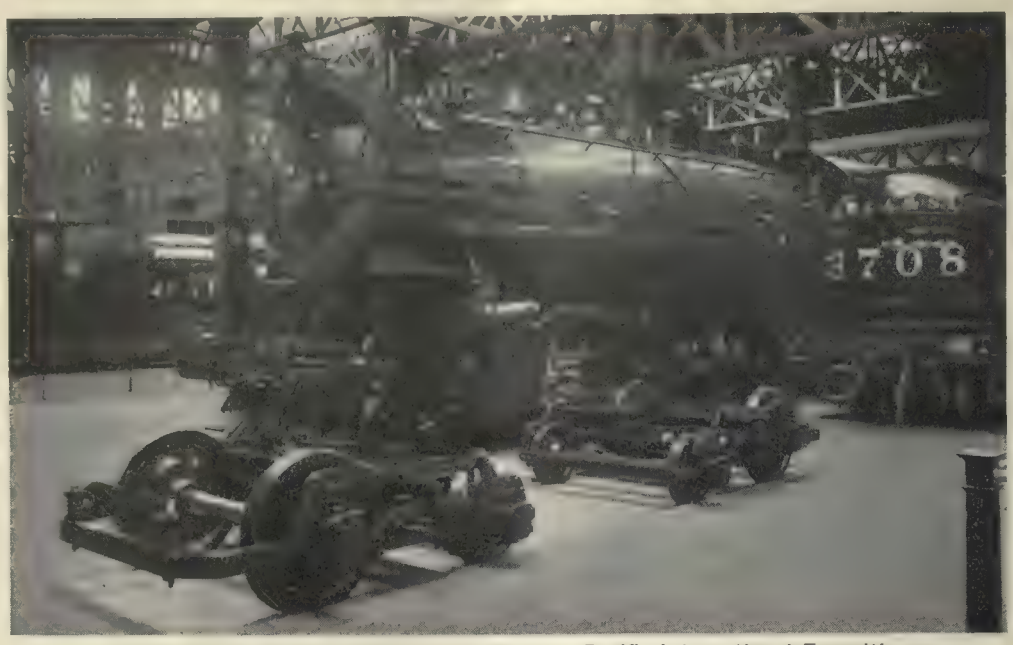

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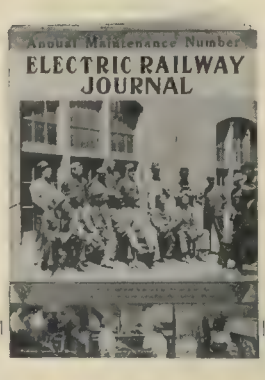

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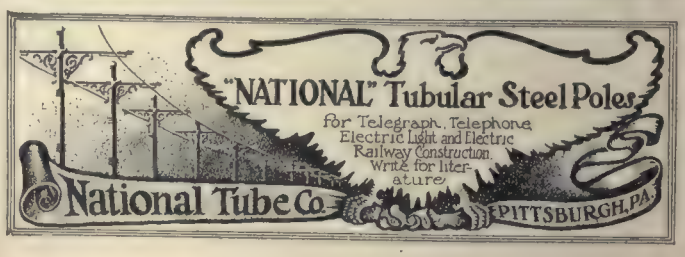

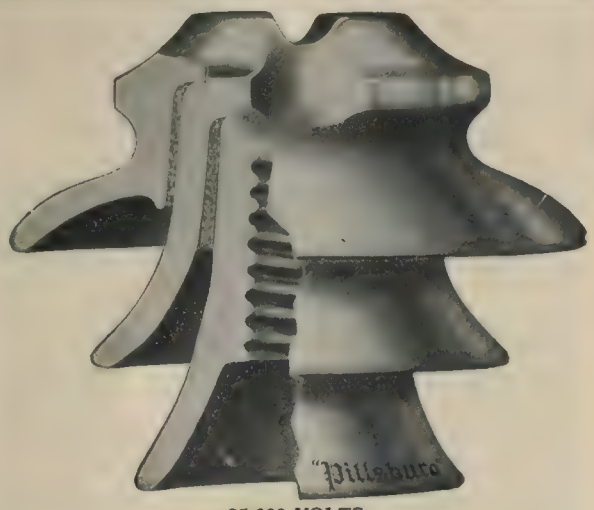

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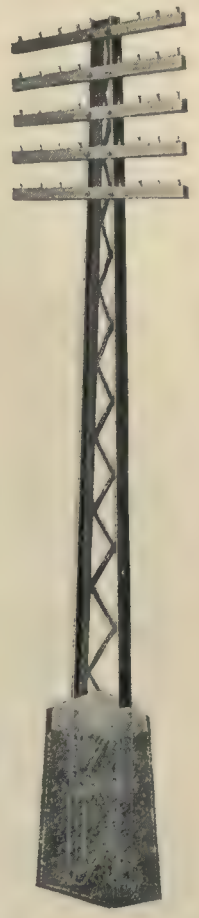

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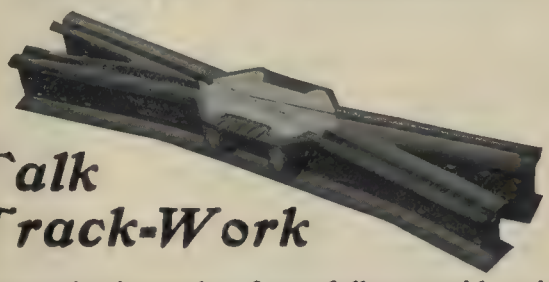

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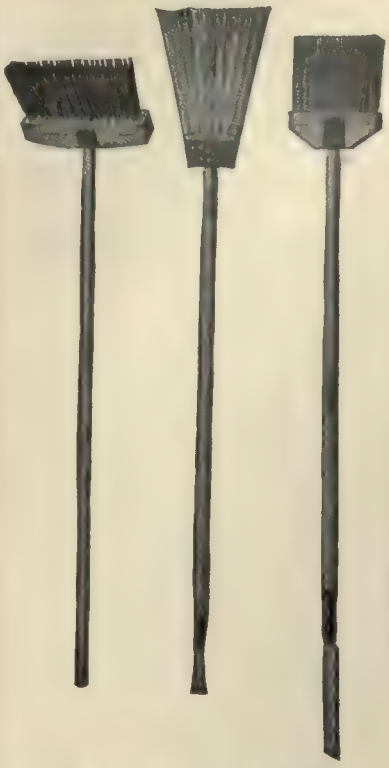

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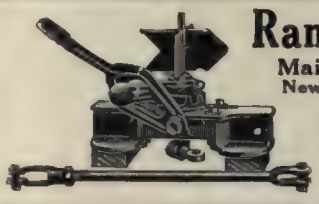

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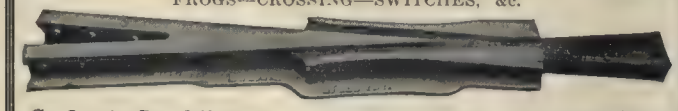

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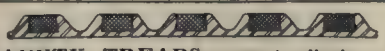

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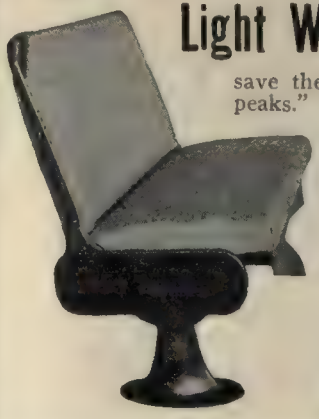

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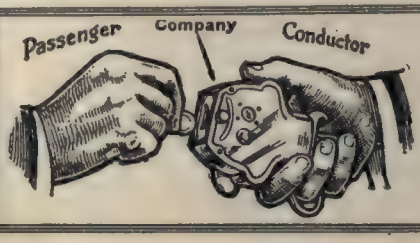

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ASSISTANT superintendent—Situation desired by graduate engineer, experienced in all departments of railway work, five years in track and construction, two years in operating as motorman, instructor, chief instructor and assistant to superintendent; fine references; hard worker; desired salary $100 a month. Box 771, Elec. Ry. Jour.

ELECTRICAL engineer, superintendent of equipment or general superintendent. Technical graduate, 13 years' experience, engineering, construction and operation. References present employers. Eastern location desired. Address Box 776, Elec. Ry. Jour.

ELECTRICAL engineer, technical graduate, 15 years' practical experience with General Electric, Westinghouse and public utility companies in engineering, construction and operation. Age 36, married; A-1 references. Box 773, Elec. Ry. Jour.

GENERAL auditor, 34, desires change. Wide and varied experience with both municipal and private concerns operating steam and electric railways (city and interurban), light and power and gas properties. Competent to take full charge of office or carry out practical, efficient, and economical auditing and accounting systems according to operating conditions. Correspondence solicited. Address Box 764, Elec. Ry. Jour.

LAND and tax agent—Situation desired by graduate civil engineer with three years' experience in this work holding that position with large Western interurban. Best references. Salary desired $110 month. Box 770, Elec. Ry. Jour.

Get your Wants into the Searchlight

ADVERTISING RATES

Positions Wanted, Evening Work Wanted, 2 cents a word, minimum charge 50 cents an insertion, payable in advance.

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All advertisements for bids cost $2.40 an inch.

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1-16 page,	$5.00	1 in. single col.,	$3.00
1-8 page,	10.00	4 in. single col.,	11.60
1-4 page,	20.00	8 in. single col.,	22.40

In replying to advertisements, send copies of testimonials, etc., instead of originals.

POSITIONS WANTED

MASTER mechanic open for position. Twenty years' experience maintaining rolling equipment, interurban and local. Can handle men to advantage. A1 references. Am American, married. Address Box 774, Elec. Ry. Jour.

SALESMAN—Situation desired as salesman by graduate civil engineer, thirteen years' experience in all departments of electric railway work in both East and West. Three months as salesman of lubricating oil. Best references. Good worker. Box 772, Elec. Ry. Jour.

POSITIONS WANTED

STREET railway superintendent with 22 years' practical experience wishes to make a change. Thoroughly acquainted with all branches of the work. Economical and capable manager, very successful in handling men. Box 775, Elec. Ry. Jour.

TRACK foreman, roadmaster or engineer—Situation desired by graduate technical engineer experienced as foreman, inspector, chief clerk way and structures department, purchasing agent, twelve years' experience, nine with Stone & Webster; best references; hustler; salary desired $100 month. Box 769, Elec. Ry. Jour.

FOR SALE

New Trolley Wire Bargain

Eighteen One-Mile Reels

No. 0000 Hard Drawn Grooved Copper Trolley Wire

On Original Reels

Bought by Mistake
Low Price to Move Quick

Wire or Telephone Us

ZELNICKER
WALTER A. ZELNICKER SUPPLY COMPANY
St. Louis

RAILS, EQUIPMENT, ETC.

Undisplayed Cards Under Positions Wanted Cost 50 Cents for 25 Words

Keep Your Eyes on the Journal's Searchlight Section

Machinery Advertisements Undisplayed Cost $1.50 for 50 Words

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Over 300 different products are here listed.

The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

Accountants.
Greims Corporation, H. E.

Acetylene Service.
Searchlight Co., The.

Advertising, Street Car.
Collier, Inc., Barron G.

Air Cleaners.
Lord Mfg. Co.

Alloys, Steel and Iron
Titanium Alloy Mfg. Co.

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Anchors, Guy.
Johns-Manville Co., H. W.
Westinghouse Elec. & M. Co.

Architects
Kennard, Ralph B.

Automobiles and Busses.
Brill Co., The J. G.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles.
Brill Co., The J. G.
Cambria Steel Co.
Carnegie Steel Co.
Cincinnati Car Co.
National Tube Co.
Niles Car & Mfg. Co.
St. Louis Car Co.
Standard Steel Works Co.
U. S. Metal & Mfg. Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
American General Eng'g Co.
Columbia M. W. & M. I. Co.

Badges and Buttons.
International Register Co., The

Bankers and Brokers.
Halsey & Co., N. W.

Batteries, Dry.
Johns-Manville Co., H. W.
Nungesser Carbon & Battery Co.

Batteries, Storage.
Electric Storage Battery Co.
Esterline Co.

Bearings, Center.
Baldwin Locomotive Works.

Bearings and Bearing Metals.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G
More-Jones Brass & Metal Co.
St. Louis Car Co.

Bearings, Roller and Ball.
Railway Roller Bearing Co.

Bells and Gongs.
Brill Co., The J. G.
Electric Service Supplies Co.
Ohio Signal Co.
Reiter, G. C.
St. Louis Car Co.

Benders, Rail.
Niles-Bement-Pond Co.

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co.
Johns-Manville Co., H. W.

Boiler Coverings.
Johns-Manville Co., H. W.

Boiler Graphite.
Dixon Crucible Co., Jos.

Boiler Tubes.
National Tube Co.

Boilers.
Babcock & Wilcox Co.

Bond Clips.
Electric Railway Improv. Co.

Bond Testers.
American Steel & Wire Co.

Bonding Tools.
American Steel & Wire Co.
Electric Railway Improv. Co.
Electric Service Supplies Co.

Bonds, Rail.
American Steel & Wire Co.
Electric Railway Improv. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Roebling's Sons Co., John A.

Book Publishers.
McGraw-Hill Book Co., Inc.

Boring, Tools, Car Wheel.
Niles-Bement-Pond Co.

Braces, Rail.
Kilby Frog & Switch Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Piling and Lumber.)
American Bridge Co.
Bates Expanded Steel Truss Co.
Electric Service Supplies Co.
Lindsley Bros. Co.

Brake Adjusters.
Anderson Brake Adjuster Co.
Sauvage-Ward Brake Co.

Brake Shoes.
American Brake S. & Fdy. Co.
Barbour-Stockwell Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts.
Anderson Brake Adjuster Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
Lord Mfg. Co.
National Brake Co.
St. Louis Car Co.
U. S. Metal & Mfg. Co.
Westinghouse Traction Brake Co.

Brazing. (See Welding.)

Bridges and Buildings.
American Bridge Co.

Brooms, Track, Steel or Rattan.
Paxson Co., J. W.

Brushes, Carbon.
Calebaugh Self-Lubricating Carbon Co.
Dixon Crucible Co., Jos.
General Electric Co.
Jeandron, W. J.
LeCarbone Co.
Morgan Crucible Co.
Nungesser Carbon & Battery Co.
Westinghouse Elec. & M. Co.

Bumpers, Car Seat.
Electric Service Supplies Co.
Imperial Rubber Co.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.

Bunkers, Coal
American Bridge Co.

Bunting.
Boyle & Co., Inc., John.

Bushings, Fibre.
Diamond State Fibre Co.

Bushings, Rubber.
Imperial Rubber Co.

Buttons. (See Badges and Buttons.)

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc., see those Headings.)

Car Trimmings. (For Curtains, Doors, Seats, etc., see those Headings.)

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Cincinnati Car Co.
Jewett Car Co.
Kuhlman Car Co., G. C.
Niles Car & Mfg. Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.

Castings, Composition or Copper.
Anderson M. Co., A. & J. M.

Castings, Gray Iron and Steel.
American B. S. & Fdry. Co.
American Bridge Co.
American General Eng'g Co.
Columbia M. & W. & M. I. Co.
Falk Co.
Long Co., E. G.
St. Louis Car Co.
St. Louis Steel Fdry. Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.

Castings, Malleable and Brass.
American B. S. & Fdry. Co.
American General Eng'g Co.
Long Co., E. G.
St. Louis Car Co.

Catchers and Retrievers, Trolley.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Long Co., E. G.
Lord Mfg. Co.
Wood Co., C. N.

Ceiling, Car.
Pantasote Co.

Change Carriers.
Etter, Chas. F.
McGill Ticket Punch Co.

Cheese Cloth.
Boyle & Co., Inc., John.

Circuit Breakers.
Cutter Electrical & Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Clamps and Connectors, for Wires and Cables.
American General Eng'g Co.
Anderson M. Co., A. & J. M.
Electrical Engineers Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Klein & Sons, M.
Standard Railway Supply Co.
Westinghouse Elec. & M. Co.

Cleaners and Scrapers, Track. (See also Snow-Plows, Sweepers and Brooms.)
Brill Co., The J. G.
Cincinnati Car Co.

Cleats, Car Wiring.
General Electric Co.

Clusters and Sockets.
General Electric Co.

Coal and Ash Handling. (See Conveying and Hoisting Machinery.)

Coil Banding and Winding Machines.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Coil Impregnation.
Vacuum Impregnating Wks.

Coils, Armature and Field.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Roebling's Sons Co., J. A.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines.
International Register Co., The
Johnson Fare Box Co.

Commutator Slotters.
American General Eng'g Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Wood Co., Chas. N.

Commutator Truing Devices.
American General Eng'g Co.
General Electric Co.

Commutators or Parts.
American General Eng'g Co.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
Westinghouse Elec. & M. Co.

Compressors, Air.
Curtis & Co. Mfg. Co.
General Electric Co.
Westinghouse Trac. Br. Co.

Condensers.
General Electric Co.
Westinghouse Machine Co.

Conduits, Flexible.
Fibre Conduit Co.

Conduits, Underground.
Fibre Conduit Co.
Johns-Manville Co., H. W.

SHACKLED

If an elephant exerts elephant force he can break almost any bond.

Yet you see natives weave a rope of grass in a few seconds and tie the elephant with it.

This flimsy cord, and a warning, serve to keep him from running away.

A little "pep" on the part of the elephant would give him freedom. Flimsy grass cords of custom bind a good many railway men in the same way.

Take brushes, for instance.
Few have any real idea of the economies possible by a *prescription* of *Morganite* brushes by Morgan *brush engineers.*

Start something. All it requires to have these economies made evident is to drop a note *now* to

The Morgan Crucible Company Limited
120 Liberty St, New York City

Factory, Brooklyn

AGENTS:

Lewis & Roth Co., 312 Denckla Bldg., Philadelphia
Electrical Engineering & Mfg. Co.
First National Bank Bldg., Pittsburgh

The Highest Grade Portable Instruments Ever Produced!

Weston

Model 45 D. C. Portable Ammeters and Voltmeters

Designed to meet the demand for a medium-priced Ammeter and Voltmeter. They are guaranteed to be of sufficient accuracy (one per cent) for general testing in electric power plants, or for outdoor work.

They are shielded from the influence of external magnetic fields, the movement and magnetic system being enclosed in an iron case permanently mounted in a handsome wooden carrying-box with hinged cover.

The scale has a mirror over which the knife-edge pointer travels. Readings can be made within 1/10 of a division at any part of the scale.

In mechanical and electrical workmanship the Weston Model 45 Portable Ammeters and Voltmeters practically attain perfection.

A full description will be found in Bulletin 501, which will be mailed to you on request.

Weston Electrical Instrument Co.
21 Weston Ave., Newark, N. J.

New York	St. Louis	Cleveland	Toronto	Berlin
Chicago	Denver	Buffalo	Montreal	Paris
Philadelphia	San Francisco	Cincinnati	Winnipeg	London
Boston	Detroit	Richmond	Vancouver	Petrograd

"Trade Mark Reg. U. S. Pat. Off."
Samson Spot Waterproofed Trolley Cord
Made of fine cotton yarn braided hard and smooth. Inspected and guaranteed free from flaws. Proved to be the most durable and economical. Samples and information gladly sent.
1 **SAMSON CORDAGE WORKS, BOSTON, MASS.**

The "Hycap-Exide" Battery
for
STORAGE BATTERY STREET CARS
THE ELECTRIC STORAGE BATTERY CO.
PHILADELPHIA

Hard scale is a habit that any engineer can overcome by the regular use of
DIXON'S BOILER GRAPHITE
Save money, work, time and trouble. Write for free booklet No. 108-T.
Made in Jersey City, N. J., by the
JOSEPH DIXON CRUCIBLE COMPANY
Established 1827

When writing to Advertisers in this publication you will confer a favor on both publisher and advertiser by mentioning the
Electric Railway Journal

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Controller Regulators.
Electric Service Supplies Co.

Controllers or Parts.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Kerschner Co., Inc., W. R.
Westinghouse Elec. & M. Co.

Controlling Systems.
General Electric Co.
Westinghouse Elec. & M. Co.

Converters, Rotary.
General Electric Co.
Westinghouse Elec. & M. Co.

Conveying and Hoisting Machinery.
American Bridge Co.
Green Eng'g Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
Imperial Rubber Co.
International Register Co., The
Long Co., E. G.
Roebling's Sons Co., John A.
Samson Cordage Works.

Cord Connectors and Couplers.
Electric Service Supplies Co.
Samson Cordage Works.
Wood Co., Chas. N.

Cotton Duck.
Boyle & Co., Inc., John.

Couplers, Car.
Brill Co., The J. G.
Cincinnati Car Co.
Long Co., E. G.
Van Dorn Coupler Co.
Westinghouse Trac. Brake Co.

Cranes. (See also Hoists.)
Niles-Bement-Pond Co.
Thew Automatic Shovel Co.

Creosoting. (See Wood Preservatives.)

Cross Arms. (See Brackets.)

Crossing Signals. (See Signals, Crossing.)

Crossings, Track. (See Track, Special Work.)

Culverts.
American Rolling Mill Co.
Atlas Metal Works.
Bark River B. & Culvert Co.
California Corr. Culvert Co.
Canton Culvert & Silo Co.
Coast Culvert & Flume Co.
Corrugated Culvert Co.
Delaware Metal Culvert Co.
Dixie Culvert & Metal Co.
Hardesty Mfg. Co., R.
Illinois Corrugated Metal Co.
Independence Cor. Culvert Co.
Iowa Pure Iron Culvert Co.
Kentucky Culvert Co.
Lee-Arnett Co.
Lone Star Culvert Co.
Lyle Corrugated Culvert Co.
Michigan Bridge & Pipe Co.
Montana Culvert Co.
Nebraska Culvert & Mfg. Co.
Nevada Metal Mfg. Co.
New England Metal Cul. Co.
North East Metal Cul. Co.
Northwestern Sheet & I. Wks.
O'Neall Co., W. Q.
Ohio Corrugated Culvert Co.
Pennsylvania Metal Cul. Co.
Road Supply & Metal Co.
Sioux Falls Metal Culvert Co.
Spencer, J. N.
Spokane Corr. Cul. Co.
Tennessee Metal Culvert Co.
Utah Corr. Culvert & Flume Co.
Virginia Metal & Culvert Co.
Western Metal Mfg. Co.

Curtains and Curtain Fixtures.
Brill Co., The J. G.
Electric Service Supplies Co.
Pantasote Co., The.
Railway Supply & Curtain Co.
St. Louis Car Co.

Cushions, Field Coil.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.

Derailing Devices.
Cleveland Frog & Crossing Co.
U. S. Metal & Mfg. Co.

Despatching Systems.
Northey-Simmen Signal Co., Ltd.
Simmen Auto. Ry. Sig. Co.

Detective Service.
Drummond's Detective Agency
Wisch Service, P. Edward.

Door Operating Devices.
Electric Service Supplies Co.

Doors, Asbestos.
Johns-Manville Co., H. W.

Doors and Door Fixtures.
Brill Co., The J. G.
Electric Service Supplies Co.
Hale & Kilburn Co.

Doors, Folding Vestibule.
Electric Service Supplies Co.

Doors, Steel Rolling.
Kinnear Mfg. Co.

Draft Rigging. (See Couplers, Car.)

Drills, Track.
American Steel & Wire Co.
Electric Service Supplies Co.
Long Co., E. G.

Dryers and Purifiers, Oil. (See Purifiers and Dryers, Oil.)

Dryers, Sand.
Zelnicker Supply Co., W. A.

Engineers, Consulting, Contracting and Operating.
Archbold-Brady Co.
Arnold Co.
Bemis, Anthony J.
Burch, Edw. P.
Byllesby & Co., H. M.
Drum & Co., A. L.
Ford, Bacon & Davis.
Greims Corporation, H. E.
Gulick-Henderson Co.
Hatch, E. G.
Hovey, M. H.
Hunt & Co., Robert W.
Jackson, D. C., & Wm. B.
Kennard, Ralph B.
Richey, Albert S.
Roosevelt & Thompson.
Sanderson & Porter.
Scofield Engineering Co.
Stone & Webster Eng. Corp.
White Companies, J. G.
Woodmansee & Davidson, Inc.

Engines, Gas and Oil.
Westinghouse Machine Co.

Engines, Steam.
Westinghouse Machine Co.

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American General Eng'g. Co.
Brill Co., The J. G.
International Register Co., The
Johnson Fare Box Co.

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American Steel & Wire Co.

Fencing, Wire.
American Steel & Wire Co.

Fenders and Wheel Guards.
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Fender Co.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Parmenter F. & W. G. Co.
Star Brass Works.

Fibre
Diamond State Fibre Co.
Westinghouse Elec. & M. Co.

Fibre Tubing.
Diamond State Fibre Co.
Fibre Conduit Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & M. Co.

Field Coils. (See Coils.)

Fire Extinguishing Apparatus.
Imperial Rubber Co.
Johns-Manville Co., H. W.
Pyrene Mfg. Co.

Fire-proofing Material.
Johns-Manville Co., H. W.

Fittings, Malleable, Cast Iron & Brass.
National Tube Co.

Flooring, Composition.
American Mason Safety T. Co.
Johns-Manville Co., H. W.

Forgings.
Standard Steel Works Co.

Furnaces. (See Stokers.)

Fuses and Fuse Boxes.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & M. Co.

Fuses, Refillable.
Columbia M. W. & M. I. Co.
Economy Fuse Mfg. Co.
Johns-Manville Co., H. W.

Gaskets.
Diamond State Fibre Co.
Imperial Rubber Co.
Johns-Manville Co., H. W.
Power Specialty Co.

Gas Producers.
Westinghouse Machine Co.

Gates, Car.
Brill Co., The J. G.
Cincinnati Car Co.
Jewett Car Co.

Gear Blanks.
Carnegie Steel Co.
Diamond State Fibre Co.
Standard Steel Wks. Co.

Gear Cases.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Kerschner Co., Inc., W. R.
Westinghouse Elec. & M. Co.

Gears and Pinions.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Diamond State Fibre Co.
Electric Service Supplies Co.
General Electric Co.
Kerschner Co., Inc., W. R.
Long Co., E. G.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

Generators, Alt.-Current.
General Electric Co.
Westinghouse Elec. & M. Co.

Generators, Dir.-Current.
General Electric Co.
Westinghouse Elec. & M. Co.

Gongs. (See Bells and Gongs.)

Gongs, Rotary Foot.
Reiter, G. C.

Graphite.
Dixon Crucible Co., Jos.
Morgan Crucible Co.

Grates, Chain.
Green Engrg. Co.

Greases. (See Lubricants.)

Grinders, Portable, Electric.
Indianapolis Switch & Frog Co.
Railway Track-work Co.

Grinders and Grinding Wheels.
Indianapolis Switch & Frog Co.

Guards, Cattle.
American Bridge Co.

Guards, Trolley.
Electric Service Supplies Co.

Harps, Trolley.
American General Eng'g. Co.
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Star Brass Works.
Universal Trolley Wheel Co.

Headlights.
Electric Service Supplies Co.
Esterline Co.
General Electric Co.
Long Co., E. G.
St. Louis Car Co.
Westinghouse Elec. & M. Co.

Headlinings.
Pantasote Co.
U. S. Metal & Mfg. Co.

Heaters, Car, Electric.
Johns-Manville Co., H. W.

Heaters, Car, Hot Air.
Cooper Heater Co.
Smith Heater Co., Peter.

Heaters, Car, Hot Water.
Cooper Heater Co.
Smith Heater Co., Peter.

Heaters, Car, Stove.
Electric Service Supplies Co.

Hoists and Lifts.
Curtis & Co., Mfg. Co.
Duff Manufacturing Co.
Ford Chain Block & Mfg. Co.
Niles-Bement-Pond Co.

Hose, Pneumatic and Fire.
Imperial Rubber Co.
Johns-Manville Co., H. W.

Hydraulic Machinery.
Niles-Bement-Pond Co.

Hydrogrounds.
Brach Supply Co., L. S.

Impregnating Apparatus. (See Vacuum Drying Apparatus.)

Inspection.
Elec'l Testing Laboratories, Inc.
Hunt & Co., Robert W.

Instruments, Measuring, Testing and Recording.
Esterline Co.
General Electric Co.
Johns-Manville Co., H. W.
Sangamo Electric Co.
Westinghouse Elec. & M. Co.
Weston Elec. Instrument Co.

Insulating Cloths, Paper and Tape.
American Vul. Fibre Co.
Anderson M. Co., A. & J. M.
Diamond State Fibre Co.
General Electric Co.
Imperial Rubber Co.
Johns-Manville Co., H. W.
Massachusetts Chemical Co.
Sherwin-Williams Co.
Walpole Tire & Rubber Co.

The Dividing Line

Safety **Danger**

"D & W" Fuses

You can follow the example of important electric railways like the New York Interborough and put your rolling stock under the protection of "D & W" Fuses.
They are economical protection. We are not only speaking of the safety they insure to railroad properties, but of the fact that they will not blow UNDER their rated capacity.
Instead of the defective interior construction of inferior fuses, you have a link construction scientifically designed. Riveted joints and perfect alignment guarantee perfect electrical conductivity.
One word—INVESTIGATE.

D & W FUSE COMPANY
Providence, R. I.

3

Tape Talks No. 4

The Tape on the High Tension

The responsibility resting on tapes and compounds used for the insulation of high tension cable splices is exceeded by no other application. A homogeneity of quality—a uniformity of dielectric strength—a permanency of efficiency that defies all service conditions, without deterioration, is an absolute necessity in materials for high tension work. Our No. 280 High Tension Cable Tape and Neponset Splicing Compound were especially designed to efficiently fulfill these conditions. Their service records show that they do. Write for quotations.

Walpole Tire & Rubber Co.

Massachusetts Chemical Co.'s Products
Walpole, Mass.
Pioneers in Insulation Engineering

71678

SAFETY FIRST ECONOMY renewable cartridge FUSES

SAFETY FIRST—ECONOMY NEXT

Non-renewable fuses are an expense. A good, renewable fuse is an investment.
The only good Renewable Fuse on the market is marked "Economy"

Write for Catalog No. 2 and Bulletin

ECONOMY FUSE & MFG. COMPANY, KINZIE AND ORLEANS STS., CHICAGO

IRCO FRICTION TAPES are the Standard

For Electric Railway and Lighting Use

Economy and Efficiency Combined

IMPERIAL RUBBER CO., 253 Broadway, New York, U. S. A.

KINNEAR Steel Rolling Doors

FOR CAR HOUSES

Compact, Durable, Easily and Speedily Operated and Fireproof. Openings of any size may be equipped and the doors motor-operated if desired. Manufactured by the
KINNEAR MANUFACTURING CO., Columbus, Ohio
BOSTON PHILADELPHIA CHICAGO

Sterling Insulating Varnishes
Sterling Iron Enamel Paints

There is a Sterling product best for every insulating purpose.

TRADE TODD PROCESSES MARK

The Sterling Varnish Co.
Pittsburgh, Pa.

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Insulation. (See also Paints.)
Anderson M. Co., A. & J. M.
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Imperial Rubber Co.
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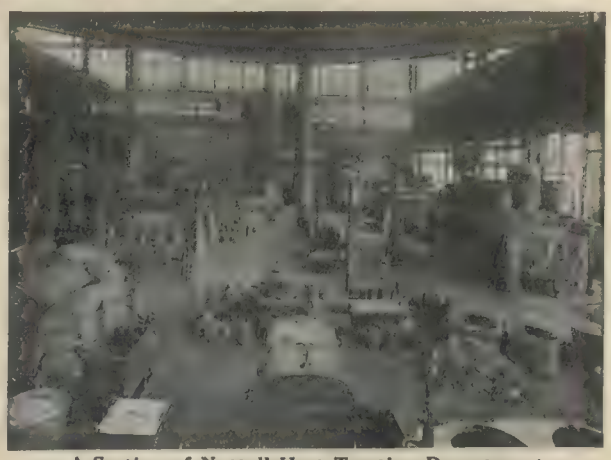

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Jewett Car Co.
Pantasote Co.

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Electric Service Supplies Co.

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Thew Automatic Shovel Co.

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St. Louis Car Co.
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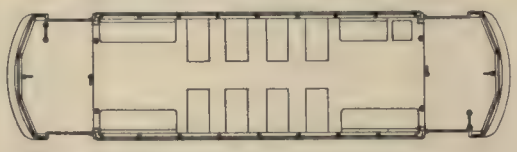

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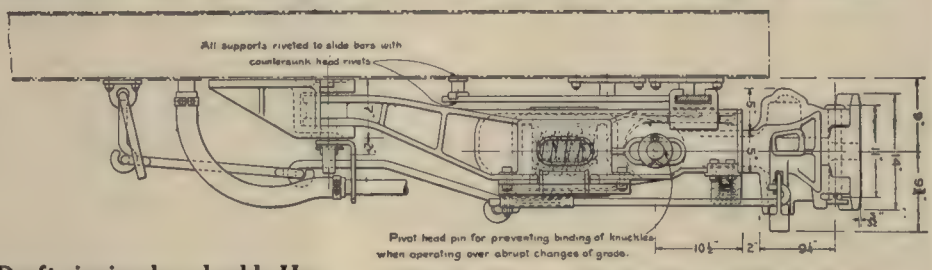

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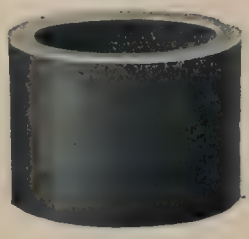

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Printing begins on Tuesday of each week.
Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.
New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.
If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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Titanium in Rail Steel

No. 24

The outstanding fact is that none of the rails which failed were Titanium-treated rails

THE CHICAGO & ALTON RAILROAD COMPANY

Chicago, June 14th, 1915

The Titanium Alloy Mfg. Co.,

1845 Peoples Gas Bldg., Chicago.

Gentlemen:-

In harmony with your request, I beg to advise that we purchased in 1912-13, substantially 22,000 tons of Open Hearth 90 lb. ARA Series "A" rail. Of this order, 6,000 tons of this rail were treated with .10% titanium. All of the rail was laid without selection at all points along the line of our road where rail renewals were determined. A considerable proportion of this rail, or to be exact, 47 track miles, was laid on our Western Division where we have our worst grade and curve conditions.

This rail has now all been in the track substantially two years and been subjected to very heavy traffic. Of this total tonnage, we have had forty rail failures and none of these rails to fail were from the 6,000 tons of titanium treated rails.

It is obvious that there is substantially 27% of the fore going 22,000 tons treated with ferro-titanium alloy and, as stated, not one of these rails has failed or has any evidence of failing so far as I am now advised although they are all given a very careful inspection.

We are observing these rails with the greatest interest with a view of ascertaining their relative merits.

Yours very truly,

A. T. Douglas

Chief Engineer

D-C

TITANIUM ALLOY MANUFACTURING COMPANY

Operating Under Rossi Patents

Processes and Products Patented

General Office and Works:
Niagara Falls, N. Y.

TPC
Reg. U. S. Pat. Off.
TRADE MARK

Pittsburgh Office: Oliver Building
Chicago Office: Peoples Gas Building

New York Office: 15 Wall Street

AGENTS:

Great Britain and Europe: T. ROWLANDS & CO., Sheffield, England

Galena Service is Far Reaching

To the Galena experts bearings are just as important as oils.

Their business is to give the benefit of their wide experience with the object of increasing savings above the amount specified in the Galena contract—the benefit of which goes to the road.

Galena oils and Galena service will materially reduce your lubricating and maintenance cost.

Let us state what we will guarantee to save your road.

Galena-Signal Oil Co.
Franklin, Pa.

-152

Volume 46
Number 1
July 3, 1915

ELECTRIC RAILWAY JOURNAL

McGraw
Publishing
Co., Inc.

The right place to effect economy is at the mill. $2.00 invested in TITANIUM here yields $20.00 in rail saving. It's up to you to specify

TITANIUM Treatment

TITANIUM ALLOY MANUFACTURING CO.
Niagara Falls, N. Y.

No. 307-CV

45 HP at
500 Volts
55 HP at
600 Volts

Weight
Complete
2630 lbs

WESTINGHOUSE
ELECTRIC

An Excellent Motor

Box frame type. For medium city or light, moderate speed interurban service.

Embodies all of the desirable features known to the art—pressed steel gear case, effective ventilation, "through bolts", axle dust guards, minimum weight, combined with maximum capacity and great mechanical durability. Built to stand the severity of service where frequent starts and stops are made.

Write our nearest office for leaflet No. 3832.

Westinghouse Electric & Manufacturing Co.

East Pittsburgh, Pa.

Sales Offices in all Large Cities.

Electric Railway Journal

New York, July 3, 1915

Volume XLVI No. 1 Pages 1 to 46

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Four years of development have brought the Pittsburgh design into its probable final form. A description is published, including consideration of the details of construction of the low-floor motors and the control without resistance.

ELECTRIC RAILWAY JOURNAL, July 3, 1915. 7¾ cols. Ill.

Pacific Claim Agents' Convention 8

Abstracts are given of six of the papers presented at the annual meeting of the Pacific Coast Claim Agents' Association. Result of the election of officers.

ELECTRIC RAILWAY JOURNAL, July 3, 1915. 8½ cols.

Following Up Watt-Hour Meter Records at El Paso 12

The installation of watt-hour meters by the El Paso (Tex.) Electric Railway is described. The meters and methods have stood up well after nearly four years of service.

ELECTRIC RAILWAY JOURNAL, July 3, 1915. 3 cols. Ill.

New York Electric Railway Association Meets 14

The subjects discussed were types of city and suburban cars, financial conditions, jitneys and interurban highway crossings, while public relations were considered at the banquet.

ELECTRIC RAILWAY JOURNAL, July 3, 1915. 15½ cols.

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The New York Jitney Law.
Rating of Railway Substation Machinery.

ELECTRIC RAILWAY JOURNAL, July 3, 1915. 2 cols. Ill.

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Under the auspices of the A. E. R. A. and N. E. L. A. a meeting is held in Manila at which public and private ownership of utilities is discussed. Committee and section activity.

ELECTRIC RAILWAY JOURNAL, July 3, 1915. 4 cols.

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ELECTRIC RAILWAY JOURNAL, July 3, 1915. 18 cols. Ill.

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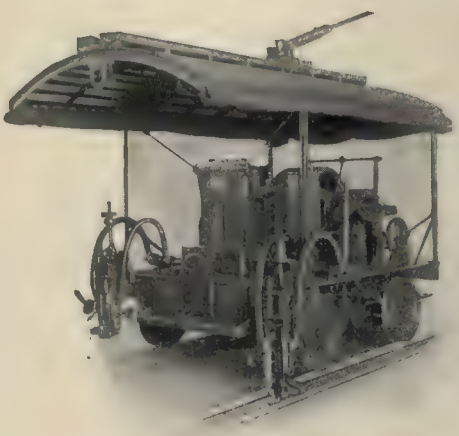
ERICO

Rail Bonds

Electric Weld and Copper Weld



Portable Combination Plant
For Electric and Copper Welding

Electric Weld

THE well known Welded Rail Bonds as manufactured by The Electric Railway Improvement Company have been on the market for the last ten years.

After a careful investigation of the service this type of bond has given, the Westinghouse Company came to the conclusion that they should be added to their list of railway supplies.

Our salesmen in your locality will be pleased to discuss this method of bonding with you.

Write for Catalogue and Bonding Notes

Westinghouse Electric & Manufacturing Co.

East Pittsburgh, Pa.

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
Bluefield, W. Va.
Boston, Mass.
Buffalo, N. Y.
Butte, Mont.
Charleston, W. Va.
Charlotte, N. C.
Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio
Columbus, Ohio
*Dallas, Tex.
Dayton, Ohio
Denver, Colo.
Detroit, Mich.
*El Paso, Tex.
*Houston, Tex.
Indianapolis, Ind.
Joplin, Mo.
Kansas City, Mo.
Louisville, Ky.
Los Angeles, Cal.
Memphis, Tenn.
Milwaukee, Wis.
Minneapolis, Minn.
New Orleans, La.
New York, N. Y.
Omaha, Neb.
Philadelphia, Pa.
Pittsburg, Pa.
Portland, Ore.
Rochester, N. Y.
St. Louis, Mo.
Salt Lake City, Utah
San Francisco, Cal.
Seattle, Wash.
Syracuse, N. Y.
Toledo, Ohio
Washington, D. C.

*W. E. & M. Co. of Texas.

FRICTION

(Its relation to efficient brake control of moving trains)

FRICTION IS A RETARDING FORCE IN SOCIETY, POLITICS, BUSINESS AND RELIGION.

BUT FRICTION REPRESENTS A CURIOUS PARADOX IN THE VARIOUS FIELDS OF ENGINEERING AND MECHANICS. IT IS AT ONCE ESSENTIAL TO EFFICIENCY AND OPPOSED TO IT. PRACTICALLY ALL APPLICATIONS OF POWER DEPEND FINALLY UPON FRICTION; ALSO ALL POWER APPLICATIONS ARE SUBJECT TO SERIOUS LOSSES DUE TO FRICTION.

A RAILROAD TRAIN IS PECULIAR IN THAT WHILE ACCELERATION—THE HAULING CAPACITY OR TRACTIVE EFFORT OF THE LOCOMOTIVE—DEPENDS FUNDAMENTALLY UPON FRICTION—(WHEEL—RAIL); DECELERATION—BRAKE CONTROL OF ALL TRAIN MOVEMENT—ALSO DEPENDS FUNDAMENTALLY UPON FRICTION (WHEEL—SHOE).

ON THE ONE HAND WE HAVE HEAVY TRAINS AT HIGH SPEEDS REPRESENTING UNBELIEVABLE TOTALS OF FOOT TONS OF ENERGY; ON THE OTHER HAND WE HAVE, TO CONTROL THIS MOVING MASS, THE FRICTION OF A FEW SQUARE INCHES OF BRAKE SHOE IN CONTACT WITH A ROTATING WHEEL.

BRAKE SHOE FRICTION AND TRAIN RETARDATION RESULTING THEREFROM VARY WITH LEVERAGE, PRESSURE, TEMPERATURE, DURATION OF CONTACT, LOCATION OF BRAKE SHOE ON WHEEL, BRAKE MECHANISM DESIGN INVOLVING ABILITY TO ALTERNATE AND GRADUATE BRAKING POWER ON THE TRAIN, AND A HUNDRED OTHER FACTORS WHICH ENTER INTO THIS MOST COMPLEX AND INVOLVED BRANCH OF AIR BRAKE ENGINEERING.

AIR BRAKE ENGINEERING IS MAINLY CONCERNED WITH THE FLEXIBLE, RELIABLE AND EFFECTIVE APPLICATION OF FRICTION TO PROPERLY CONTROL ALL TRAFFIC MOVEMENT BY RAIL.

Suggested by the

Westinghouse Traction Brake Company

Works: Wilmerding, Pennsylvania

PITTSBURGH: Westinghouse Building
CHICAGO: Railway Exchange Building
NEW YORK: City Investing Building
ST. LOUIS: Security Building

PUBLISHER'S PAGE

Buy, Boom and Use
Advertised Products
Because:

[1]
Advertising is a sign of good faith whereby the promise is irrevocably set before the eyes of the buying world.

[2]
Advertising is a symbol of progressive methods that recognize the sound business sense of "satisfaction first."

[3]
Advertising conserves the buyer's time by acquainting him with a product at his leisure, long before the buying need arises.

[4]
Advertising is useful only to those who have a message of genuine service to tell.

[5]
Advertising is a bond of fair dealing, for only a promise performed can justify the cost of a promise published.

[6]
Advertised statements bear the stamp of authority from those responsible for the conduct of the organization whose signature is published.

[7]
Advertising is an economy and cuts the cost of selling, making lower prices or better goods possible without sacrifice of the producer's profits.

[8]
Advertisers are almost invariably the most successful business men in their industry, and success in business is inseparable from service rendered.

[9]
Advertising in a given field is evidence of a well-founded belief in ability to serve it.

[10]
Advertising can long prove profitable only to producers of meritorious products.

In succeeding issues, we plan briefly to discuss the buyers' interests in connection with advertised products under each of the headings outlined above.

READ THE SERIES — APPLY IT—

Buy, Boom and Use Advertised Products

O-B Lock Hangers and Extruded Ears In Cuba

A particularly fine piece of construction in the Island Republic makes use of these two O-B Specialties that are giving universal satisfaction.

O-B Lock Hanger eliminates the loose joint between Hanger and Ear at "A". Gives a better job than the old style Hanger and requires no more of the lineman's time.

O-B Extruded Ears are easy to install and have long life. The method of manufacture of Extruded Metal imparts to it those physical properties long desired for trolley ears—ductility and toughness.

O-B Catalog No. 14 gives full details.

The Ohio Brass Co.
Mansfield, Ohio

Patch Bituminous Asphalt with a KOEHRING HOT MIXER

Cuts patching costs

Write for *authoritative* figures to prove the economy

—cuts your costs way below your best possible figures in remelting and remixing by stationary plant, or having the work done under contract—and this means a cut, *not* in remelting and remixing costs *alone, but in the total cost of ripping up, remixing and relaying old material.*

Besides think of the flexibility of this smaller unit. Haul it from job to job behind a car, use trolley power.

Give this cost-saving hot mixer a *hearing*, especially on its cost-cutting claims for patch work.

800 square yards per day, new 2 inch material.

That's what this mixer can do per day with new 2 inch bituminous material.

Also mixes concrete,—disconnection of asphalt tank and blower and connection of water tank turns it into concrete mixer with capacity of 180 square street yards *per hour.*

Write for cost figures of electric railways which are using this mixer—and remember, its costs-saving justifies its use even if you have a stationary plant.

KOEHRING MACHINE CO.
MILWAUKEE, WIS.

Re-melting and Re-mixing Old Asphalt

Here's What "Electric Service" Signals Are Doing

Direct View of "Electric Service" Signal on the Terre Haute, Indianapolis & Eastern Traction Co. Lines

The Terre Haute, Indianapolis and Eastern Traction Company on December 14th, 1914, placed in service one block of "Electric Service" Automatic Block Signals. To and including April 30th, 1915, they recorded 16078 car movements with but 13 failures—**an efficiency of 99.919 per cent, counting all failures.**

Of these 13 failures, 3 were traceable to the Signal Department, 3 were traceable to blown fuses, 6 were traceable to defective apparatus, 1 traceable to miscellaneous trouble.

Omitting the 3 failures each traceable to Signal Department and blown fuses, counting only the remaining 7, gives these "Electric Service" Signals **an efficiency of 99.956 per cent—a truly remarkable showing.**

A letter under date of May 26th from the company reads as follows:

"I am enclosing herewith a report of the operation of the Reliable Signals installed on our Crawfordsville Division, between Junction and Crawfordsville.

"This report is for a period of five months. The signals were put in service December 14, 1914, and taking everything into consideration, I believe that this is a pretty good showing. Judging from the performance in March and April, I believe that the longer the signals are in use the more familiar our men will be with them, and no doubt prevent, so far as practicable, avoidable failures.

"It is my opinion that the failures charged to signals not clearing when trains left block may in some cases have been due to train switching in Crawfordsville while regular train was in the block."

Complete copy of this report will gladly be sent to interested parties on request.

Why not take up your signalling problems with us now and let us prove just what the use of "Electric Service" Signals will mean to you?

ELECTRIC SERVICE SUPPLIES CO.

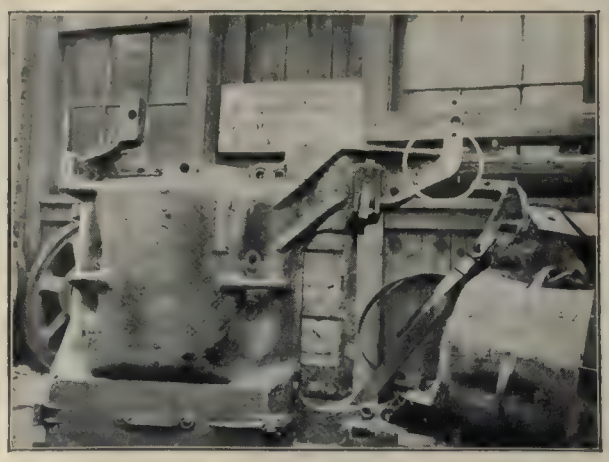
Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Sts.

NEW YORK
Hudson Terminal

CHICAGO
417 So. Dearborn St.

Building up a guard rail with the Prest-O-Lite welding outfit. This simple operation obviates expensive disorganization of traffic and loss of time that replacing by any other method would require.



This motor frame was made good as new with the same welding outfit that was used for line work in the picture to the left. The arm was welded on, at trifling expense compared to any other method of repairing.

PREST-O-LITE

Dissolved Acetylene makes the Oxy-Acetylene Process of greater utility in railway work

It enables every electric railway, large or small, to enjoy *every* economy of time, labor and materials that only this process of joining or cutting metals gives. Prest-O-Lite makes good welding or cutting equipment a general purpose outfit, instead of a single purpose machine, with added capabilities, added efficiency and increase in quality of work done.

Enables you to use the same outfit for Rail Bonding and for Shop Repairs

The applications of oxy-acetylene welding are almost unlimited. New uses and added savings are being found daily. You can make immediate savings on damaged or worn equipment, avoid costly breakdowns, expensive delays and replacements by "on the spot" welding repairs. The apparatus being portable, can be taken to the job—dismantling of heavy equipment is unnecessary. Welding equipment pays for itself many times over when used for repair work alone. It is a good investment as "stand by" equipment. But the same outfit can be used to equal advantage in the yard and on the line.

No other method of rail bonding approaches the oxy-acetylene process for ensuring a contact which will not be reduced in efficiency by time and service. Thousands have been applied to new and existing track at a minimum expense and with no disorganization of traffic. The outfit stands at the side of the track.

Then, too, there are times when twenty minutes' use of an oxy-acetylene cutting blowpipe will prevent tie-ups which would be unavoidable by any other method of clearing the track.

Back Your Acetylene Supply by Permanent Service

Prest-O-Lite Acetylene Service furnishes the highest grade of Dissolved Acetylene in portable cylinders, used as conveniently as you use cylinders of oxygen. Saves the large initial outlay and heavy depreciation, trouble and inconvenience of making crude Acetylene in carbide generators. Besides, Prest-O-Lite Dissolved Acetylene is perfectly dried, cleaned and purified—makes better welds and is cheaper to use.

Ask us for information on Oxy-Acetylene Welding and Cutting in the electric railway field, and full details of Prest-O-Lite Acetylene service. Your name on the margin of this page will do.

The Prest-O-Lite Co., Inc., 805 Speedway Indianapolis, Ind.

The World's Largest Makers of Dissolved Acetylene

53 direct factory branches and charging plants in principal industrial centers

Phono Electric

for CATENARY

Or any other Construction

It's Tough Trolley Wire

When you specify trolley wire—be sure you ask for **"Phono-Electric"**.

"Phono-Electric" is the best wire for keeping down maintenance costs and—that's just what you want in an over-head wire.

The increased demand for better rolling stock and better road-beds as well as faster schedules makes it imperative that a saving in over-head costs be maintained.

"Phono-Electric" is tough and will save you money—it will give more car mileage and longer service life.

BRIDGEPORT BRASS COMPANY

BRIDGEPORT CONNECTICUT

North American Copper Company
164 Front Street, New York, U. S. A.

Phono-Electric

Pierson, Roeding & Company
San Francisco Portland Seattle Los Angeles

The Equipment & Engineering Company
2 and 3 Norfolk St., Strand, W. C., London, England

HAVOC!

Telephone, Telegraph and Trolley Poles all felled by a storm. This may happen on any line using wooden poles. A storm—high wind—and poles are snapped like matches. Avoid the liability of breakdowns. Use

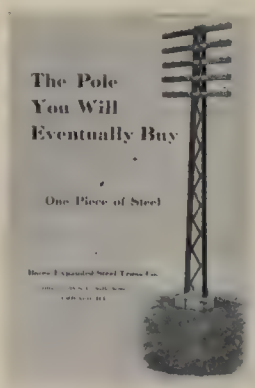
BATES One Piece Steel Poles

Their predominant feature is the one-piece steel truss construction—made of one piece of steel—not a fabricated pole. Strength is not sacrificed in keeping down the weight. Note the truss formation; it has great strength—it will not burn or break.

Small surface is exposed to the elements. Thoroughly coated with preservative.

Permanent construction in addition to remarkably low first cost. Get our prices on trolley and feeder poles.

Investigate Bates claims. Satisfy yourself as to economies. Send for this catalog.

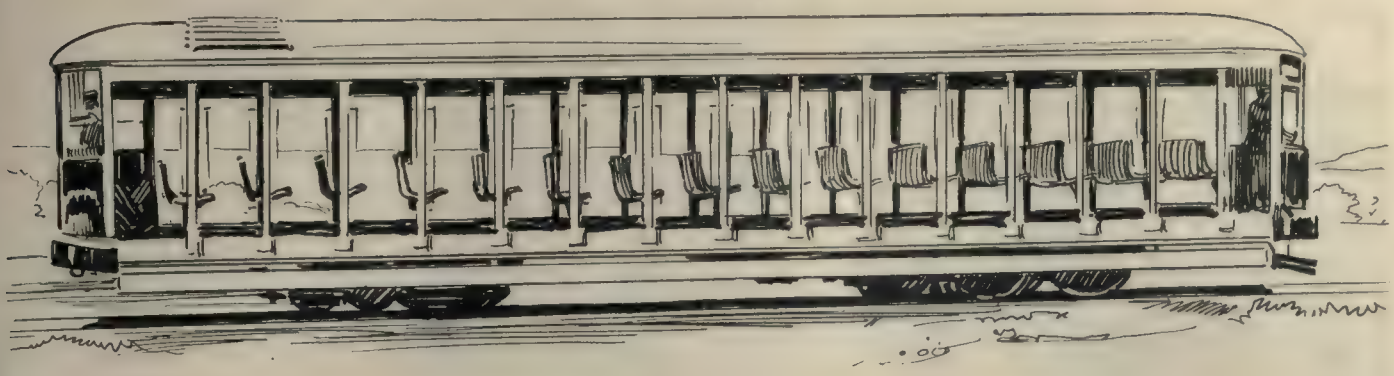


The Pole You Will Eventually Buy

Bates Expanded Steel Truss Co.

Office: 210 So. La Salle Street

CHICAGO, ILL.



Empty Seats

and high resistance rail joints are in the same profitless class.

Both represent power waste.

The solution of power-consuming rail joints lies in making permanent joints—in knitting them into one single circuit with

Electric Weld Rail Bonds

They can't corrode.

They can't shake loose under vibration.

They are literally one with the rails.

Write for list of users.

The Electric Railway Improvement Co.

Cleveland, Ohio

Up To Date Track Weeding

The Day of Application

141 Days Later—Clean Tracks

Figuring for low track maintenance has come to include the weeding of tracks. It is a chronic case of worry with electric railway men who have not tried the

Atlas "A" Method

Not only is manual weeding expensive, but its benefits are not lasting. We have figured that three men with Atlas "A" Equipment will do twice as much weeding as 400 men. And every weed handled the Atlas "A" way will be **dead**—from top to root, and including **seed.** There will be no next generation of weeds.

All you furnish are the motive power and the weeds. The responsibility is ours. **It standardizes track weeding.**

Write for the Catalog we show above. **Write today.**

Atlas Preservative Company of America, Inc.

95-97 Liberty Street, New York

2521

E. R J.

The Hundred Eyes of Fabled Argus

and the fifty heads of Briareus are literally at your command when you engage our staff of specialists to concentrate their experience on one or more of your engineering or chemical difficulties. We have already set forth in separate advertisements the various fields in which we can help you to operate your properties with greater safety at less expense, but

Our Diverse Activities in Power and Railway Consultation

may be summarized by outlining our services for each department. To co-operate with your power engineer we have specialists in fuel, water, and general equipment. For your distribution and line engineer, we have specialists in bonding, electrolysis, choice of wires and cables, insulators and insulation, etc. For your way engineer we have specialists in rails, structural material, timber and timber preservation. For your car equipment engineer, we have specialists in everything from castings and bearing composition to motors, conduit, paint and varnish. But despite this high degree of specialization, our individual chemists and engineers are checked from making decisions which might unduly favor their specialty by a system of teamwork and records that brings to bear on any single problem the broad, united experiences of all. When to this practice is added the condition that we have absolutely no commercial interest at stake other than to please you, the utility of our service calls for no further argument.

ARTHUR D. LITTLE, Inc.

Chemists and Engineers

93 Broad Street, Boston, Mass.

RICO

Use Your Old Straps

—but make them sanitary and more sightly

With Rico Sanitary Strap Covers

The advertising value of snow-white, non-absorbent sanitary straps cannot be questioned.

The fact that they are standard on the majority of roads is pretty good evidence that they have answered a demand.

No new car is properly dressed without them.

Let us show you how little they cost.

Railway Improvement Co.
61 Broadway, New York
Chicago Los Angeles

MONTREAL

CHICAGO

ATLANTA

SAN FRANCISCO

RICO

High Speed Parlor Car, Empire United Ry., Syracuse, N. Y.

Rollway Bearings in Interurban Service

They Conserve Energy

They Save Lubrication

They prolong equipment life

¶ Above is shown a car equipped with Rollway Bearings in daily service between Syracuse and Rochester, N. Y.

¶ Tests show that Rollway Bearings effect a current saving over plain journals ranging from 15% to 20%. Lubrication costs are reduced because of minimized friction and the oil-tight, dust-proof design of the bearings. The wear on wheels, track and car is minimized.

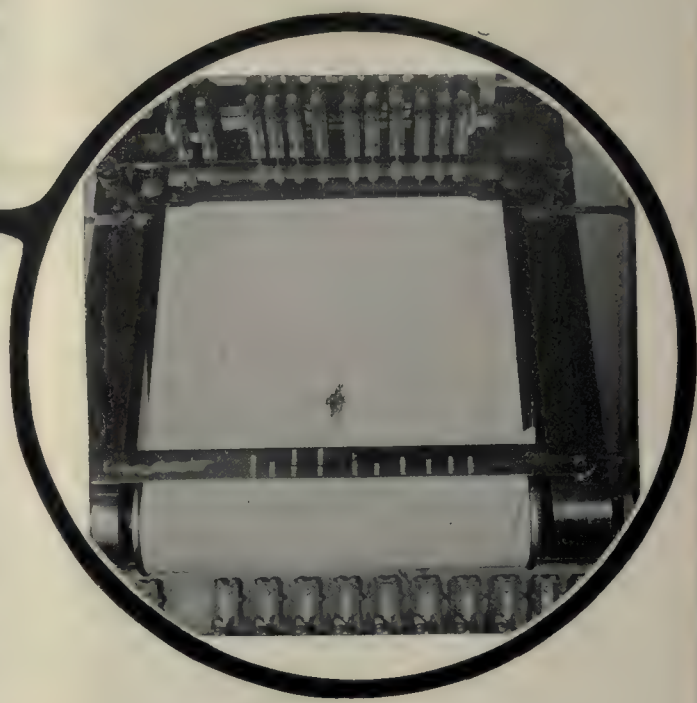
¶ Rollway Bearings can be applied to any type of car. Write for all the facts. Better still, **write and arrange to test a set in service.**

The Railway Roller Bearing Co.

SYRACUSE, N. Y.

Rollway Bearings for Journals and Motors

Automatic Recording of Car Movements



THE instant a car enters the block, it automatically records on this sheet its entry to that block, and the exact time at which it entered. The sheet then records automatically the length of time the car remains in the block and records the time of its entry to the next block.

With this continuous graphic train sheet, as utilized in

The Simmen System

the dispatcher has before him, every instant, the location of every car on the division, and that location is visualized to him. He has literally a moving picture of the movements of every car on the road all the time, a permanent record of the time of entry to every block, and a permanent record of the length of time each block is occupied.

By means of interlocked control levers on his table, the dispatcher controls continuous cab signals in every car on the division. These signals positively indicate the dispatcher's orders to each motorman, and are so placed in the cab that the motorman MUST see them. By consulting his record sheet, the dispatcher can see the location of every car, and if he desires to change the signals given to any of them, he can do so by simply turning one of his control levers. This combination provides SAFE OPERATION and greatly increases FACILITY OF OPERATION.

The value of this permanent record sheet does not by any means end with its value to the dispatcher in moving cars safely and expeditiously. It forms a permanent document of the highest value for improving schedules, and for fixing individual responsibility under all circumstances.

The indication of the records cannot be questioned, as they are automatically made by the movement of the cars themselves.

Automatic recording of car movements is only one of the interesting features of the Simmen System. This system presents a flexibility which enables it to meet varying conditions of traffic from those encountered on the light traffic interurban road to those found in the heavy traffic subways.

*May we tell you how we can meet **your** conditions?*

Simmen Automatic Railway Signal Co.

1575 Niagara Street, Buffalo, N. Y.

The Old Way

The New Way

Finigan Says:

I submit views of our old and new style of protecting single-track lines; view 1 is of the old type of hand-throw signal used, having to entirely depend upon crew to operate Signal, which caused a certain amount of delay and a chance of running past signal.

On our new installation of the United States Automatic Electric Signals we have done away with that certain amount of delay and the chances.

These signals are used to protect about a mile of single track, with a turn-out about half way, over which two different railways operate a line of cars, each road using the turn-out as a meeting-point.

Under old conditions when one line would run late it would naturally delay the other line, but under the present conditions these delays have been done away with.

In December, 1914, 2 sets of the United States Automatic Electric Signals were installed on this line and have been operating successfully up to the present.

Yours respectfully,
Chas. Finigan, Line Foreman

Westchester Electric
Railroad Company

And they will do the same for you. Why don't you ask us about "Signals Without an Appropriation"?

United States Electric Signal Company

West Newton, Massachusetts

Foreign Representatives

Quilliam Brothers, Cleggs Court, Chapel Street, Salford, England

U.S. ELECTRIC SIGNAL CO. WEST NEWTON, MASS.

3165

ELECTRO-PNEUMATIC

INTERLOCKING

BEST EVERYWHERE

This Electro-pneumatic Interlocking is operating successfully in paved streets.

A. C. Magnets - No Batteries - Switch Valves on curb.

The Union Switch & Signal Co.

Founded by Geo. Westinghouse 1881.

SWISSVALE, PA.

Trade Mark

Hudson Terminal Bldg. NEW YORK

Peoples Gas Bldg. CHICAGO

Canadian Express Bldg. MONTREAL

Candler Annex ATLANTA

Railway Exchange Bldg. ST. LOUIS MO.

Pacific Bldg. SAN FRANCISCO

Represented by the GENERAL ELECTRIC CO. in Australasia, South Africa and Argentina

Trade Mark

JOHNS-MANVILLE SERVICE
COVERS THE CONTINENT

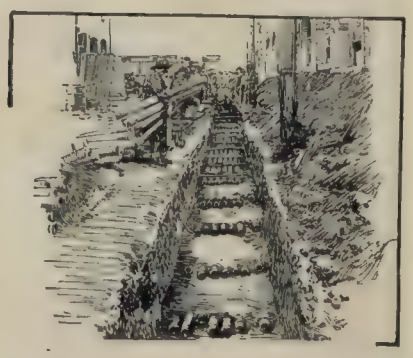
Let us SERVE you first—afterward we hope to sell you, because if we can gain your confidence you will WANT to buy from us.

Every engineer has individual problems—problems of gaining power, of cutting down waste—problems that need all his experience and knowledge in the solving. The H. W. Johns-Manville Company, through its organization of experts and its vast army of representatives, is constantly in touch with thousands of such individual problems and is constantly helping electrical engineers and central station managers by suggestions and recommendations leading to greater efficiency in their work.

When a J-M salesman calls on you, give him a chance. Perhaps there is a question in the back of your mind that you have not quite found the answer for. Perhaps Johns-Manville Service answered that question for an engineer a thousand miles away from you. If so, the answer is for you, too.

Put it up to the J-M salesman, and if he has not got the answer at the time, he'll get it. For that is J-M Service—to serve first, sell afterward.

Your installation crew will move along three times as fast when they work with J-M Fibre Conduit



Pacific Light & Power Co., Los Angeles, Cal., Installing J-M Fibre Conduit

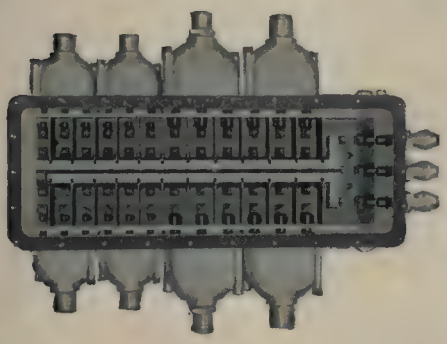
Every time they nipple up a length—five feet of duct is finished, with an airtight joint made in a trice.

They will work quicker and easier too, because of the lightness of this conduit; nor can they break it easily when it gets thrown around, as it often does.

J-M Fibre Conduit answers every underground conduit requirement, electrical or mechanical. It can be used generally all over the underground system in Generating Stations, Sub-Stations, back of Switchboards, on Feeders and on Signal Systems.

Why not use it on your system?

Every "Noark" Subway Box you order is subjected to an internal hydraulic test of 15 lbs. per sq. inch



This is the severest ordeal to which a cast iron box can be subjected.

You will note that not only is the box water-tight from the outside, but is also air-tight from the inside.

Doesn't this argue well for its manhole efficiency; for protection of your feeders, subfeeders and other cables—against seepage and subterranean gases?

When you install "Noark" Subway Boxes you are using a box with a big factor of safety—a box that is electrically and mechanically perfect, from the nuts that hold down the cover to the slate base on which the copper is mounted.

The copper in "Noark" Subway Boxes is ample and well assembled. All contacts are carefully *ground*. The line is complete, embracing every network and distribution condition.

Write for literature on both these products.

H. W. JOHNS-MANVILLE CO.

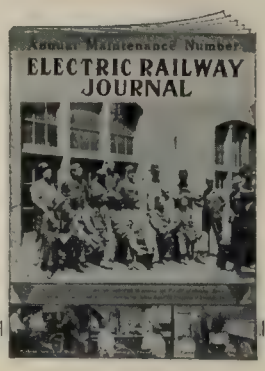
Manufacturers of Service, Subway and Transformer Boxes; Line Materials; Insulating Materials; Fibre Conduit; Fireproof Wood; Friction Tapes; Dry Batteries, Lighting Systems, etc.

Akron, Albany, Atlanta, Baltimore, Birmingham, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Columbus, Dallas, Dayton, Denver, Detroit, Duluth, Galveston, Houghton, Houston, Indianapolis, Kansas City, Los Angeles, Louisville, Memphis, Milwaukee, Minneapolis, Newark, New Orleans, New York, Omaha, Philadelphia, Pittsburgh, Portland, Rochester, St. Louis, St. Paul, Salt Lake City, San Francisco, Seattle, Syracuse, Toledo, Washington, Wilkes-Barre, Youngstown

THE CANADIAN H. W. JOHNS-MANVILLE CO., LIMITED, Toronto, Montreal, Winnipeg, Vancouver

3031-A 3054

Your *Own*



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You receive your own copy of the paper each week.
You have it to read when you want it and as long as you want it.
You can keep your own file of the paper for reference.

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But there are times—and many of them—when you want to read the latest issue, and some one else has it.

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For less than six cents a week

you can be a personal subscriber—you can get all the news of the field while it is still fresh and valuable—you can have copies when you want them.

You will never miss the subscription price, but you miss a lot of things when you do not have **your own** copy of the Journal every week.

Better send your order today before it is forgotten. Use this order form.

.....1915

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You may send ELECTRIC RAILWAY JOURNAL beginning at once for one year to address below. I will remit subscription price of $3 within 30 days.

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POSITION .....STATE.....

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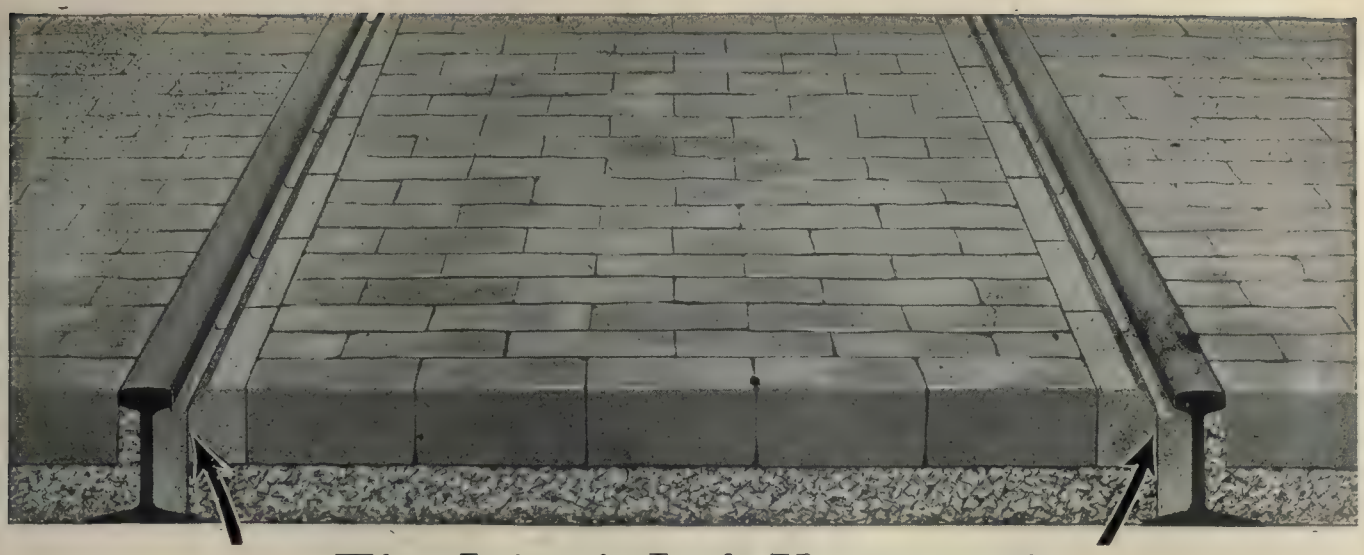


The Joint is Left Ungrouted

City Officials Approve T-Rail

When the Paving is Protected by

NELSONVILLE Filler and Stretcher Brick

T-Rail construction in cities was given a bad name by the failures of paving due to the use of "nose-brick." The economical T-Rail was barred out of many municipalities on this account.

Now the T-Rail is **welcomed**—when paving is protected by Nelsonville Filler and Stretcher Brick.

Over a thousand miles of our brick are in use in American and Canadian cities. Officials of one hundred and twenty-five cities are prepared to show you how Nelsonville Filler and Stretcher Brick has given them better paving and fewer repairs.

The old-fashioned method of using "nose-brick" with T-Rail resulted in breaking up the paving slab between the rails. The "nose-brick" projected beneath the ball of the rail and were literally "pried-up" by rail vibration.

Compare the diagram above with such construction.

The economies of "Nelsonville" T-Rail construction—both in **lower first cost** and **decreased maintenance** are considerable.

Write for the **data.**

The Nelsonville Brick Company

Nelsonville, Ohio

The Rail Joint Company
185 Madison Avenue
New York

Best Quality Hot-Worked

High Carbon Steel

used exclusively in

Continuous
Weber
Wolhaupter

and

One Hundred Per Cent
Rail Joints.

Oil-Quenched when desired.

Patented in United States and Canada.

Agencies

Boston, Mass.	India Bldg.
Chicago, Ill.	Railway Exchange Bldg.
Denver, Colo.	Equitable Bldg.
Philadelphia, Pa.	Pennsylvania Bldg.
Pittsburgh, Pa.	Oliver Bldg.
Portland, Ore.	Wilcox Bldg.
St. Louis, Mo.	Commonwealth Trust Bldg.
Troy, N. Y.	Burden Avenue

Montreal, Canada, McGill Bldg.
London, E. C., Eng., 36 New Broad St.

Catalog on request

Stop Building Perishable Track

Make your road a highway of steel in every sense of the word. The steel rails should rest on a foundation of steel. They should not go down on ties that begin to rot soon after they are buried. Put them on

International Steel Twin Ties

They are a permanent addition to your road values. They do not have to be pulled up every little while for replacement, interfering with schedules, increasing maintenance cost, "de-stabilizing" your whole system.

All that is necessary to see why roads throughout the country are making International Steel Twin Ties part of their standard equipment is to try the ties on a section of your track, or ask your neighbor for results obtained with the International Steel Twin Ties.

Creeping and spreading of the rails are virtually unknown with these steel Ties.

Tie rods are dispensed with. Gauge spacers are unnecessary. Unskilled labor can take care of the installation.

And the first cost in paved street construction is less than wooden tie construction.

We will be pleased to furnish an estimate of cost, together with working plans of different types of construction now in use.

Write us for the facts.

International Steel Tie Co.

General Sales Office and Works: Cleveland, Ohio

REPRESENTATIVES:

Parrott & Company, San Francisco, Cal. Los Angeles, Cal.

Western Eng'g Sales Co., Seattle, Wash Portland, Ore.

R. J. Cooper Co., Salt Lake City, Utah

William H. Ziegler, Minneapolis, Minn.

J. E. Lewis & Co., Dallas, Texas

Maurice Joy, Philadelphia

Columbia Electric Hoist in service lifting 40 foot 20 ton car.

Columbia Electric Hoists

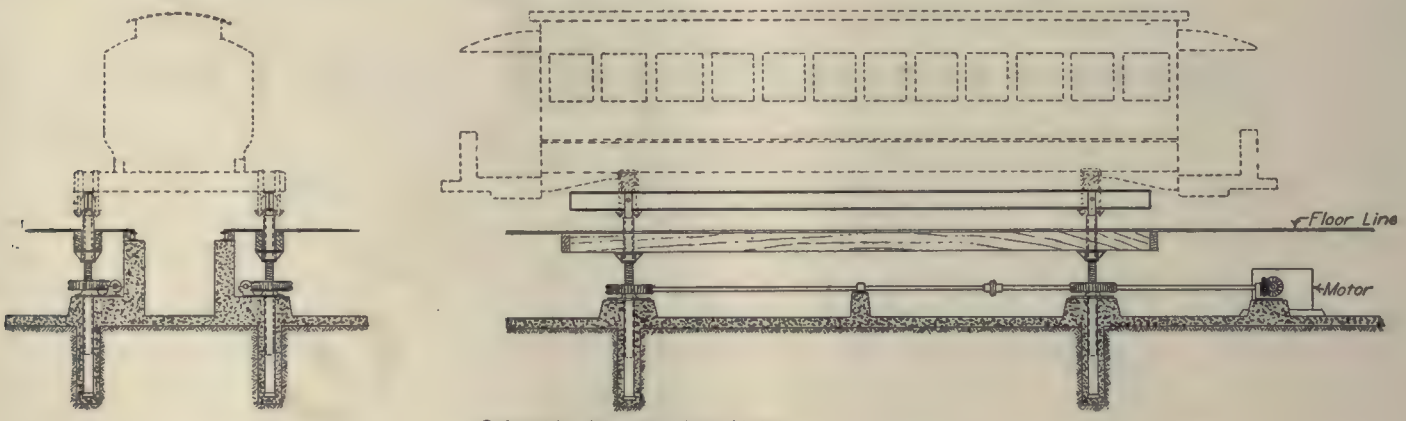
in the

Holyoke (Mass.) St. Ry. Co. Shops

In the repair shop bay of its new carhouse, the Holyoke Street Railway Company has provided two Columbia Electric Car Hoists for lifting car bodies from the trucks. Columbia Hoists were chosen because of their superior design, their ease of operation, their extra factor of strength and their contribution to repair work economy.

We can serve you just as efficiently.

Write us regarding your needs.



Columbia Electric Car Hoist

Columbia Repair Shop Specialties and Car Equipment Include

Axle and Armature Straighteners.
Bearings for Armatures and Axles.
Armature Stands, Armature Buggies.
Car Hoists, Car Replacers.
Brake Appliances, Handles, Forgings for Brake Rigging, etc.
Babbitting Moulds, Lathe Chucks.

Banding and Heading Machines.
Coil Winding Machines for field and armature coils.
Coils for Armatures and Fields.
Coil Taping Machines for Armature Leads.
Rolls for Flattening Leads of Armature Coils.
Car Trimmings, Car Signs—Day and Night.
Commutators, Controller-Handles, Door Locks.

Gear Cases—All Steel and M. I., Pit Jacks.
Grid Resistances, Signal or Target Switches.
Pinion Pullers, Trolley Poles—Steel.
Trolley Wheels, Tension Stands.
Fuses, N. W. Cartridge.
Car Wheel Hoists and Special Track Work.

Columbia Machine Works & Malleable Iron Co.

Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

The Ohmer System

HARD TIMES, JITNEYS, WARS—don't let these things get on your nerves. Tighten up the leaks and stick to methods which are *absolutely safe* in matters of finance. THE OHMER SYSTEM for making fare collections safe is a fare protection certainty. It has made good under the most adverse conditions. New applications are being made of it continually. It is a *standard* method. It is a *successful* method. It is a *safe* method. The benefits to be derived from it are the result of our years of experience. We are specialists in such matters and stand ready to serve you.

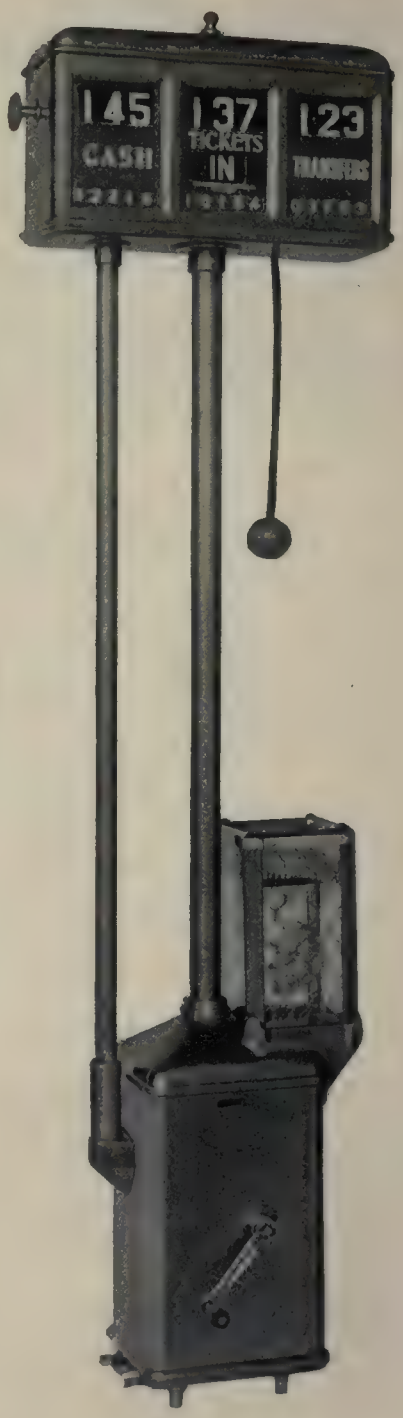
Let us analyze your troubles and we will show you a way out. If you even suspect that your local conditions are capable of improvement let us give you our expert opinion. You will be under absolutely no obligation to us. We are anxious to meet new problems for our own good as well as yours. We have met and overcome so many for our clients and others that we are confident of our ability to solve yours. Will you let us try?

Ohmer Fare Register Company
Dayton, Ohio

For better accounting and greater economy

the Lincoln (Neb.) Traction Company changed from paper to metal tickets. The register illustrated and described below was especially designed by us for them to meet the new conditions and all their cars are thus equipped.

INTERNATIONAL COMBINED COIN, METAL TICKET AND TRANSFER REGISTER, TYPE C24



THE Type C24 register is adapted for use on single end and center entrance prepayment cars. Cash Fares and Tickets are received in the one hopper of the machine and are automatically registered on separate dials. But one crank is used for operation. Transfers are received by the conductor and registered by him on a separate dial of the same machine. Bells of three differing tones also give audible indication of the class of fare registered. The three trips reset to zero by the one operation of the resetting knob.

THIS machine gives the decided advantages of one compact, simple device combining all three functions, performing them easily, quickly and economically, at the same time, giving the conductor greater freedom for attention to other duties.

Consistent with their cost, the price has been kept at the lowest possible figure. The savings attained will cover their cost in a very short time. We can demonstrate that your revenue can be increased by the use of some of the various types of our Coin counting registers. We seek an opportunity to prove our claims. If, from the many types we now manufacture, we fail to meet your requirements, we shall be glad to investigate conditions and design a machine that will.

The International Register Company, 15 South Throop St. CHICAGO

Manufacturers of Coin Registers, Fare Boxes, Double and Single Car Registers and Fittings, Conductors' Punches and Exclusive Agents for Heeren Enamel Badges

The Economical Material
for Car Seating and Curtains

A
Non-Splitting
Non-peeling
Seat covering

DU PONT FABRIKOID
REG. U. S. PAT. OFF.

A
Tough
Weather-proof
Curtain Material

Du Pont Fabrikoid Company
Du Pont Building, Wilmington, Del.
Railroad Department Representatives:
WENDELL & MACDUFFIE CO. 63 BROADWAY, NEW YORK

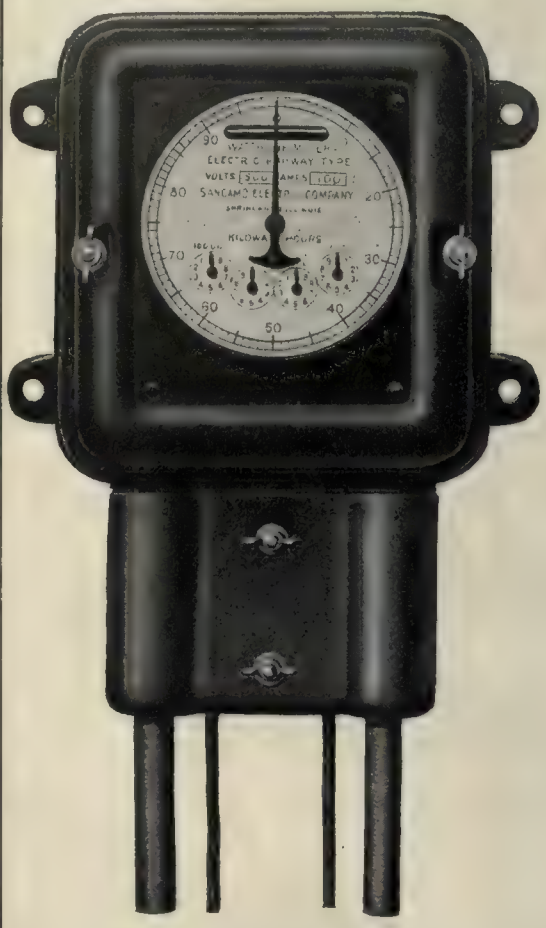
ECONOMY
SANGAMO
BUILT LIKE A WATCH
METERS

There is every reason to expect, however, that maintenance charges for the present year will show a substantial decrease over those of 1914, and this can largely be attributed to the use of meters.

EFFECT ON VOLTAGE REGULATION

One other interesting fact was brought out, and that was that the voltage at the car was far better as a result of using power only when necessary. Obviously, this is equivalent to increased trolley-wire cross-section, especially where full voltage is necessary to make the scheduled time. In 1914 the limited trains could not maintain schedule time just south of Milwaukee, due both to an exceedingly severe schedule and to the fact that they had a number of meeting points where the power distribution also was not very good. This year, with the same schedule and all other conditions the same, there has been a marked absence of delays. This is attributed principally to the fact that while the motormen are still unable to coast to any great extent, the heavy drafts of current are less continuous which results in more voltage at the car.

From Electric Railway Journal, May 22, 1915.



Type of Sangamo Economy Meter producing net saving of more than $12,000 per year for one interurban road.

Better Voltage

One prominent high-speed road installed Sangamo Economy Car Meters primarily to reduce energy consumption—and gained a net annual return of more than $12,000 on an investment of one-fifth of this amount.

Lower energy consumption per car mile was but one of the several benefits.

In addition, many other maintenance economies and schedule improvements were accomplished by means of the Economy meters.

Another improvement, that of *higher average voltage,* is described above. Note that this was accomplished with the same power equipment and the same schedule, but because *Economy* Meter Service had smoothed out the demand peaks, it was easier for the motormen to meet the schedule requirements.

Let us supply you with interesting data and a copy of Bulletin 416, giving complete details.

Sangamo Electric Company
Springfield, Illinois

NEW YORK
50 Church Street

MINNEAPOLIS
Metropolitan Life Building

ROCHESTER
Mercantile Building

You—Who Specify

It's a hard road you've got to travel these days—that of holding down expenses when nearly every cost item keeps climbing steadily upwards.

You're trying earnestly to select equipment and material for your road that will prove really economical—work long and work well. We realize how many problems of this kind come up to you and how difficult some of them are to solve the right way.

We've studied one of them thoroughly—that of trolley equipment. We've worked on it for years. The outcome is the development and perfection of a new type of trolley wheel and harp that we know will simplify your trouble along this line. The

V-K OILLESS TROLLEY WHEEL and NON-ARCING HARP

is not only more economical in operation—saving power, material, labor and renewals—but it is more efficient as well. You are spared worry and assured of the most improved trolley service possible to obtain.

In the V-K OILLESS TROLLEY WHEEL you have a practical, reliable, efficient self-lubricating wheel. Once installed you've no further expense for attention or lubrication. And it lasts longer, provides greater conductivity, saves the wire, eliminates the harm that dripping oil or grease from the bearings of other wheels causes to the car roof, besides keeping shopmen off it.

With the V-K NON-ARCING HARP you get a harp in which all wear on the pin-hole is impossible. You know that such wear is the commonest of all reasons for having to replace harps. Its patented gripping device locks the pin firmly and solidly in its socket—preventing looseness and arcing. It furnishes the best form of contact yet devised.

Just compare these points about the V-K equipment with any other type. We believe you'll see where and how it can help you.

Send for our new illustrated catalog. It contains full information on sizes, styles, etc., covering our whole line of wheels and harps.

More-Jones Brass & Metal Co.

St. Louis, Mo.

Manufacturers of Trolley Wheels and Harps, Contact Springs, Motor Axle Bearings, Armature Bearings, Truck Journal Bearings, Air Compressor Bearings, Armature Babbitt Metal and similar products.

Proper Public Policy and Private Interests

become identified in PROVIDENCE FENDERS

and

H–B LIFE-GUARDS

The Consolidated Car Fender Co., Providence, R. I.

Manufacturers of The Providence Fender and H-B Life Guard

Wendell & MacDuffie Co., 61 Broadway, New York

General Sales Agents

Clean your cars thoroughly, quickly and economically

with

Western Electric
Sturtevant
Vacuum Cleaners

Get your copy of
our booklet,
The Clean Way To Clean,
from our nearest house.

It is fully illustrated and will show you the latest way to higher efficiency.

"SAVE TIME AND FREIGHT"
DYNAMOS-MOTORS
WESTERN ELECTRIC COMPANY
CABLE-TELEPHONES-SUPPLIES
"TELEPHONE OUR NEAREST HOUSE"

Western Electric Company

Manufacturers of the 8,000,000 "Bell" Telephones

New York, Atlanta, Chicago, Kansas City, San Francisco, Montreal, London, Buffalo, Richmond, Milwaukee, Omaha, Oakland, Toronto, Paris, Philadelphia, Savannah, Indianapolis, Oklahoma City, Los Angeles, Winnipeg, Berlin, Boston, New Orleans, Detroit, Denver, Salt Lake City, Calgary, Antwerp, Pittsburgh, Houston, Cincinnati, Minneapolis, Seattle, Vancouver, Milan, Cleveland, Dallas, St. Louis, St. Paul, Portland, Edmonton, Rome, Johannesburg · Sidney · St. Petersburg · Vienna · Buenos Ayres · Tokyo

EQUIPMENT FOR EVERY ELECTRICAL NEED

"MEMBER OF"
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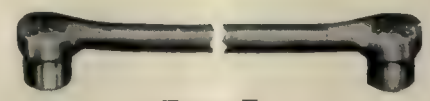
SERVICE · ENGINEERING · SAFETY
"DO IT ELECTRICALLY"

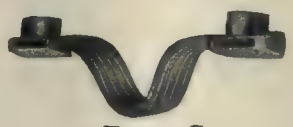
Form D



Form E

Form M 1

Form F



Form C

Form A

Use G-E Railbonds This Summer

And Make Fewer Replacements

The three million G-E railbonds in service to-day give positive proof that G-E bonds stand the test of time.

Clean copper, perfect welds, soft terminals, and accurately formed tucks insure lasting qualities and high conductivity. G-E bonds are easy to install and remain in service for many years.

It pays to insist on G-E Railbonds

General Electric Company

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
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Washington, D. C.
Youngstown, Ohio

For Michigan business refer to General Electric Company of Michigan, Detroit.
For Texas, Oklahoma and Arizona business refer to Southwest General Electric Company (formerly Hobson Electric Co.), Dallas, El Paso, Houston and Oklahoma City. For Canadian business refer to Canadian General Electric Company, Ltd., Toronto, Ont.

5601

Electric Railway Journal

Published by the McGraw Publishing Company, Inc.

Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLVI NEW YORK, SATURDAY JULY 3, 1915 No. 1

A GOOD EXAMPLE OF CO-OPERATION

The National Fire Protection Association is a body whose interests might seem to conflict with those of electric railways and other sources of insurance risks. The insurance people naturally want to get the largest possible premiums for insuring property involving the least possible fire hazards. The larger the premiums and the fewer and slighter the fires the more the insurance profits. While, of course, electric railways do not desire to have their structures unduly hazardous from the fire standpoint, yet they do not enjoy dictation from the underwriters. There is, therefore, a constant possibility of difference of opinion as to what constitutes a reasonable risk and what payments should be made for carrying it. The Fire Protection Association is under no obligation even to consult the railways in this matter and it is all the more gratifying, therefore, that they not only do call representative electric railway men into conference, but they accept the suggestions of these men. Such conferences as those held in New York and Boston within the last two months achieve results which could not possibly come from conflict and produce benefits far beyond those originally contemplated. So conspicuous has been the success of co-operation in this instance that the following words appeared in a recent N. F. P. A. committee report: "The association (A. E. R. E. A.) has displayed a spirit of strong co-operation in harmony with the National Fire Protection Association in all matters affecting mutual interest, and friendly relations exist at the present time."

ENGINEERS NEED WAY COST RECORDS

Maintenance cost records founded on a standard unit should form the basis for analyzing the relative values of way materials and types of construction. The records of most way departments indicate that information about materials, the types of construction and the track locations are carefully and accurately kept. Beyond this point most engineers have hesitated to go. They are prone to look upon analytical statistics as a prodigious task, which reveal only what comes more quickly from experience. However, we wish only to call attention to the wonderful improvements that have been made possible by the performance records and costs of generating stations and repair shops. It is only by analyzing costs on a common unit basis that results may be compared on different properties. What is still more important, definite knowledge is available which shows whether the new materials or the new types of construction used have produced the expected results. Information of this kind would be especially valuable in analyzing the merits of different types of construction and materials used in track in paved streets. Generally speaking, the track cost represents approximately 40 per cent of the total plant cost, therefore the way engineer must exercise most careful judgment in adopting new types of construction and new kinds of materials. So many years are required on most properties to obtain definite results that some basis of generally adopted comparison is all the more important. If this were done, track worn out under dense and heavy traffic would serve as an index of what might be expected of track where comparatively light traffic obtains. To what length way-department cost records could be extended we do not care even to suggest. We do believe, however, that cost records on a unit basis of the total tonnage passing over the track would be of incalculable value in making comparisons between the different types of materials and construction. It would permit engineers to analyze their maintenance methods and particularly to criticise their own work. Where the same type of track construction is under similar traffic, maintenance costs on different properties could be compared.

GREATER PROTECTION FOR COMMISSIONERS

We hope that the New York Constitutional Convention will adopt the recommendation made by representatives of public utility companies who appeared before the members last week and urged that the term of office of public service commissioners be extended from five to ten years and that the holders of such offices have constitutional protection. We have often emphasized the fact that the tenure of office of commissioners is too short for them to become properly acquainted with the questions to be solved and the precedence and the economic laws governing these public utility problems. A term of fifteen years would not be too long, but a practical fulfillment of the ten-year term for New York would be a step in the right direction. As to the other point, up to the present there has been very little advocacy of constitutional protection for commissioners. The reason for this has been the comparative newness of the idea of commission regulation. Changes in constitutions come slowly in this country, and it is well that it is so. Public sentiment has gradually been crystallizing, however, in favor of commission form of government, but so separated from politics as to keep it free from the spoils system. We would approve, therefore, any means for giving commissioners the same security of office as the higher judges, and would advocate a requirement of a concurrent resolution of both legislative houses by a two-thirds vote for removal. To be sure, the character of commissioners must

ultimately depend upon the Governor's appointive power, but under the above plan the individual commissioner would be much more secure in office, and so better able to act in an unbiased way with the cases which come before him. For the same reason, also, a better class of men would be attracted to such work.

JITNEY-BUS COMPETITION

We are wholly unable to agree with the expression of belief in the importance of the motor-bus as a competitor to the electric railway, which appears on another page of this issue, notwithstanding our respect for the opinions of its author. Undoubtedly the itinerant jitney has made serious holes in the gross earnings of a number of properties, but that fact certainly does not constitute a valid reason why the electric railway should enter the bus business with a view to recouping its losses. We have followed with the utmost care—even with a certain amount of natural anxiety—the whole of the short history of the motor-bus movement in this country, and as it stands at present the situation may be summed up in one sentence: Nowhere have there been given out any authentic records of the actual operation of motor-buses which show them to be nearly as efficient, including all costs and all factors, as are electric cars.

The author expresses fear that organized capital might engage in the business and make greater inroads into the trolley receipts than the unorganized jitney competition, but there is even less danger of this, we believe, than from the itinerant jitney. The regular bus is at a disadvantage in some respects as a traffic getter, compared with the second-hand touring car. In the first place, with the increased number of passengers more stops have to be made, and the bus cannot compete in speed with the smaller vehicle. Again, the bus does not appeal so strongly to the man who does not own an automobile as does the touring car. We have always maintained that one of the reasons which impelled some people to use the jitneys was the appearance of affluence which it gave, and this is shown by the requests often made by passengers to the driver to remove his route sign. Finally, there is no such supply of second-hand motor-buses as there is of second-hand touring cars, so that the investment required to establish a line of buses is very much greater.

Organized capital has attempted to establish 5-cent motor-bus lines in various cities, but we know of no place where they have proved at all successful. In both Pittsburgh and Los Angeles the service has been abandoned, and last week the news came from Washington that a receiver had been appointed for the Metropolitan Coach Company of that city. Of these installations it is hard to imagine any two cities in the country where the natural conditions in the way of climate, low grades and good paving are more favorable to the operation of motor-bus lines than Los Angeles and Washington.

The sale of the Los Angeles buses was mentioned in this paper several months ago. In reply to a creditor's petition for a receiver in the Washington case the company admitted its insolvency. It has never made expenses at any time during three years of operation. It was not a fly-by-night undertaking equipped with second-hand cars. It was a company operating six eighteen-passenger buses of good design over a route from Fifteenth Street and Pennsylvania Avenue (a departmental, business and hotel center) to Sixteenth and U Streets, traversing one of the best residence districts of the city. The maximum haul for a 5-cent or six-for-a-quarter fare was 1½ miles. The traffic has amounted to as many as 65,000 cash passengers a month. But the line could not be made to pay even with the most economical, not to say parsimonious, management. There is no mystery about the outcome of this experiment. It is due simply to the fact that it cost more to carry passengers than was collected for the service. What makes the Washington bus failure especially impressive is the fact that the enterprise was well backed financially and had a particularly good route. If success could not be achieved under these circumstances it would be hard to find a situation that would justify the hope of profit in jitney operation.

There is a profitable bus line in New York City. But this charges a 10-cent fare in a restricted and highly-profitable territory, and if there is another successful city bus company of reasonable size elsewhere in the country, the fact of its existence has never been published. Indeed, until someone is able to make actual, not paper, profits with buses at the 5-cent fare charged by city railways, or to serve rural districts at the same speeds and at the same fares that have been established by the interurbans, we refuse absolutely to be stampeded by the spectacular features of the motor-bus. When its advocates can point to definite results that show it to be cheaper to operate than the electric car there may be some grounds for the consideration of bus operation in general by electric railways. Until that time arrives, however, we can only reiterate a warning against taking up this over-exploited and apparently extravagant method of transporting passengers.

THE JITNEY AND THE ONE-MAN CAR

It is perhaps more than a coincidence that we printed in last week's issue two letters from railway operators advocating the use of light one-man cars as a means for dealing with the jitney problem in small cities. The jitney has certainly shown the general demand for frequent service, and in emphasizing this fact it may prove to be a blessing in disguise. As a common carrier, it has no place on the streets of the city unless it assumes the duties which pertain to all common carriers, but that it may also direct attention to ways in which electric railway service may be improved, there is no question.

Two plans have been suggested for changes in electric railway practice to meet the competition brought by the jitney. One is the adoption of the short car which, in many cities, would be the one-man car. The second, mentioned in one of the letters last week, is the establishment of a zone system with a reduced rate

of fare for a restricted zone in the center of the city. The British Columbia Electric Railway is the only company we now recall as having taken this latter step. This line, preferring to apply the "aut scissors aut nullus" policy to its fares rather than to its service, recently offered as alternative to its ordinary straight 5-cent fare a special non-transfer ticket, good only within the city limits of Vancouver and Victoria, at the rate of eight tickets for 25 cents. In the recent report of R. B. Stearns on the Milwaukee zone system the suggestion was also made, though not yet put into practice, that a reduced rate for a smaller central zone would further increase riding through the stimulation of short-haul business and through the competition with the jitney and walking. Such a step would undoubtedly be revolutionary, but these suggestions show the way in which a number of railway operators are thinking.

The one-man car, especially the light car, is not so radical a departure from existing standards, and in one of the letters mentioned actual figures were given of the low injuries and damages account on two lines using one-man cars, as well as estimated annual net savings possible with one-man over two-man service. Operators and public officials inclined to regard the accident hazard of the one-man car as prohibitory will find a revelation in these figures, and general publicity of similar statistics would do much to remove prejudice from this type of equipment. So far as its inherent profitableness is concerned, the fact that a number of engineers are now engaged in designing experimental one-man cars of exceptionally light weight bids fair to promise for the future a considerable reduction in operating expenses, even as compared with the roseate yet conservative estimates already presented.

THE CALL OF THE RAIL

To graduates of engineering schools this year who are considering electric railway work as a chosen field, we unhesitatingly say that never in the history of the industry have opportunities been better for men with a real bent toward a transportation career, backed by staying power and a determination to do every job so well that it forms a stepping stone toward the next responsibility. The day has gone when a "favorite son" with a fat allowance and an easygoing disposition can expect to go into electric railway work and hold down a man's position on a banking hours' schedule; but the time will never come when a man willing to devote practically his whole time out of bed to mastering the problems of transportation in the early years of his career on the basis of aptitude for the work and of absolute fidelity to every commission cannot advance in the traction world once he is fortunate enough to get a start.

Once the 1915 graduate becomes an employee of an operating company, let him realize that his future largely depends upon himself. The exact line of work which is first taken up is relatively unimportant. Students sometimes hesitate to enter platform service for fear that they will be swallowed up in the organization, but it is fair to say that this anxiety is largely unnecessary. A period of service at the controller and among passengers affords a trained engineer opportunity to enter into the problems of the transportation department which may be extremely valuable in comparison with the rather academic ideas often gained otherwise. The methods of handling runs, of filling in traffic blanks, day cards, and accident reports, of "signing up" for work, the close observation possible of the way in which subordinate officials perform their tasks—these and a hundred other details afford experience which may be extremely suggestive, however loath a man may be to pass more than a few months in routine duty. In years to come, when the executive of 1925 goes under cross-examination in an arbitration or court case, the mere fact of having had actual experience on the platform or as a helper in the shop may give his evidence a value which could never be the result of purely theoretical knowledge. Work in the ranks of an operating company may not in itself call for the practice of principles learned on the hidden side of the college wall, but it gives a sense of proportion and a knowledge of men that come into play exceedingly well sooner or later.

However a technically trained man may enter the service of the modern street railway, he is bound to become acquainted with the engineering and executive staff in due course and, in fact, will do well to let the employment department know his full hopes and desires when he goes into the work. Attendance at meetings of company sections of the national association, the gradual extension of friendship and continued study are likely to bring their reward in due course. Where one can enter a student course or as a recognized apprentice, so much the better. Finally, if things go too slowly after a reasonable trial, it may be possible to apply for a transfer to another department with some show of success. Sooner or later the opportunity coveted is almost sure to come to the technically trained man whose qualifications are known to his superiors, and if they are not, either the system of employment and management is wrong or the man himself must be at fault.

Sooner or later the true cost of electric transportation must be met by the communities which it supplies. This means that as long as such service is rendered, scientific work in it will be rewarded. We need not enumerate the unsolved problems of the industry. There will always be such before it, and to those of the future the young men of to-day will have to address themselves. Public relations, scientific management, the conduct of labor affairs,—these and many other questions are coming to the front more and more as the industry grows. Methods may change with the years, but the fundamental problem of economically transporting men and things will always be with us, and in no small degree the success with which its variables are evaluated in the years to come will depend upon the graduates of the present period, upon their eagerness to master details before they attempt to generalize, and upon their appreciation of the meaning of opportunity in the humblest task which is placed upon them in the drab weeks which so often follow the fall of the academic curtain.

Improvements in the Low-Floor Car

Four Years of Development Have Brought the Pittsburgh Design into Its Probable Final Form—A Description is Published, Including Consideration of the Details of Construction of the Low-Floor Motors and the Control Without Resistance

Since the low-floor car was brought out in Pittsburgh, somewhat less than four years ago, certain changes have been made from time to time with the idea of improving the operating efficiency. The first cars of this general type were trailers and were placed in service in 1911. One of these, equipped with motors, has been in regular operation since the summer of 1912, but the first cars designed especially for use as motor cars have been in use about two years. The changes in the car body, although important, are very naturally overshadowed by those made in the control system that practically eliminates the use of resistance, as well as by the motors which have made possible such an astonishing reduction in weight by permitting the use of 24-in. wheels. As these features have, in all probability, reached the commercial form in which they will remain for some time to come, detailed descriptions are given in the following paragraphs. These include also a comparison between the design of the low-floor motor and a standard motor of the same rating, which shows for the first time some of the reasons for the ability of the former to do its work in spite of its small size.

The latest developments in the low-floor car design appear in the 100 cars which were ordered some time ago by the Pittsburgh Railways Company and are being received from the builders at the present time. In general appearance the new cars are like their predecessors which were described in the ELECTRIC RAILWAY JOURNAL for April 11, 1914. However, they have lower steps because of a greater ramp in the floor, and in addition a greater proportion of the car is built from steel, the latter feature, together with other refinements in design, making it possible to reduce the weight of the car body by approximately 2500 lb.

In the center-entrance motor cars first used in Pittsburgh the top of the center door is reinforced by heavy rolled channels. In the new cars, however, the whole side of the car becomes a girder, the depth of which is from the top of the letterboard to the bottom of the side sheathing. Previously the side girder extended from the bottom of the side sheathing to the bottom of the window only, and it was necessary to reinforce heavily the parts around the center doors in order to carry the strains across this portion of the car side.

The seating capacity is sixty. By combining longitudinal and transverse seats the company has returned to a plan that was very widely used in Pittsburgh before the advent of the first center-entrance cars. Permanent seats extend around the ends of the car, the control and brake handles being mounted on pipe railings that serve as seat separators. A plan is shown on page 7.

The ramp at the center of the car is 5 in. high and 5 ft. long. This reduces the two center-entrance steps to heights of 14 in. and 9½ in. Three steps respectively 12½ in., 8½ in. and 8½ in. are provided at the front exit, the first-mentioned one being the height from the rail to the lowest step tread.

In common with the earlier designs the new cars have a front exit door and two doors at the center. The door mechanism is made up of levers, and all doors are mechanically controlled by the trainmen without the use of compressed air or electricity, it being believed that a manually-operated door is much more easily kept in order than one opened by power. The center doors are separately controlled by the conductor, so that either one or both of these doors may be used as an entrance. If a passenger sitting in the rear part of the car signals that he wants to get off, the conductor keeps the rear center door closed until he is ready to alight. The entering passengers then divide into two streams, part coming in one door and part in another. The front exit door is supposed to be used by all of the passengers in the front half of the car, although it has been found in practice that only about two-thirds of them do so.

Some remarkable results have been obtained through having two streams of passengers board simultaneously and pass on opposite sides of the fare box. The loading time per passenger at certain corners is less than one second, the average at the heavy loading points (including the time of the fellow "who never has change")

LOW-FLOOR CAR—VIEW SHOWING CENTER ENTRANCE AND FRONT EXIT

being only slightly more than one second. In general, the separate control of the center doors has been found to be an excellent feature since it permits the conductor, without saying anything to any of the passengers, to guide their movements. Also it is possible in cold weather, when only one or two people want to board the car at a certain point, to open only a small part of the car to the outside atmosphere.

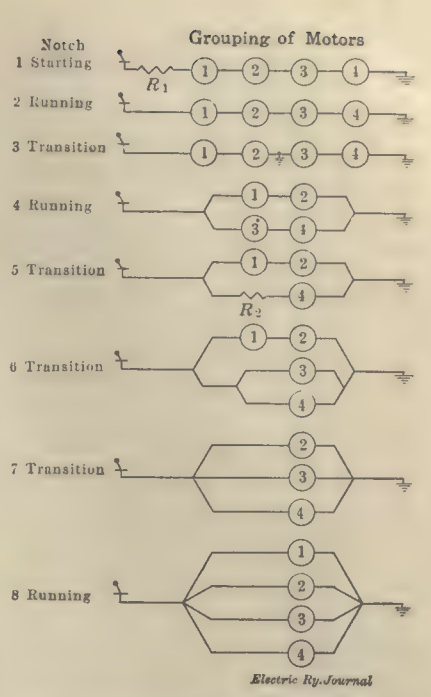
The exact weight of the new cars, fully equipped for double-end operation, with two fenders, two couplers, two controllers, etc., is 35,600 lb. If the car should be arranged for single-end operation, with only one set of doors, one controller, etc., the weight would be 33,000 lb. Car-body and equipment weights are as follows:

Weight of car body, conduit, wiring and air-brake piping	18,000 lb.
Weight of air brakes	950 lb.
Weight of motors	7,000 lb.
Weight of other electrical equipment	1,250 lb.
Weight of trucks	8,400 lb.
Total weight	35,600 lb.

The car-body weight includes all accessories as well as the air-brake piping and the wire and conduit for the motors and control. The weight of steel in the car framing is 6800 lb. The over-all length of the body is 45 ft. and the width is approximately 8 ft.

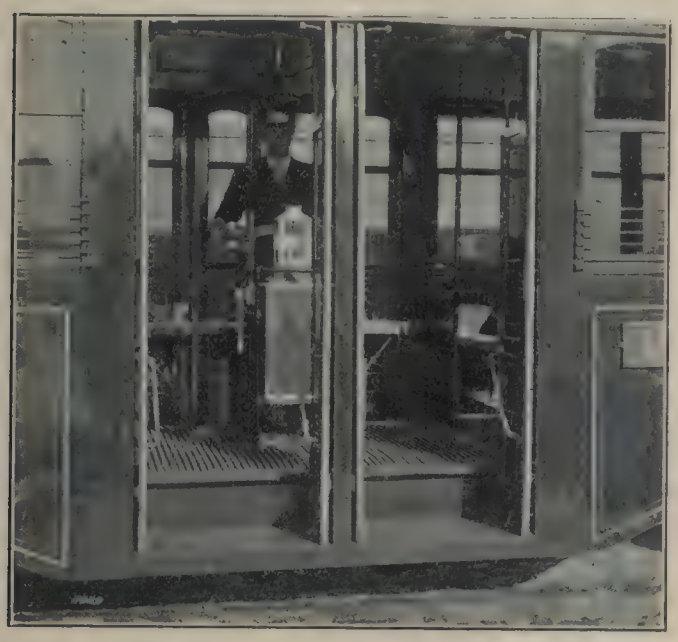
From the above table it is manifest that the low total weight of the car is brought about in great measure by the reduction in weight of the apparatus under the car rather than in the car body itself. The small wheel, in itself, reduces the weight by approximately 1200 lb. per car, and to its use can be traced almost all the other weight reductions. The axles of the trucks are lighter because of reduced strains, and the truck itself, in all its members, is lighter than with the larger wheel. In practice the lighter weights of the members are found to have ample strength. Theoretically the closer the center of gravity is to the track, the harder the impact from side motion, but in practice, in slow-speed city service, the distance that the car body travels in a side "slap" seems to be the controlling factor, since the low-floor car rides much better over rough track than the high-wheeled car. The details of the truck were worked out under the supervision of F. R. Phillips, superintendent of equipment.

The prominent feature of the truck is the elimination of end frames, the truck being held square by gussets that connect the transoms and the arch-bar-type side frames. The weight of 4200 lb. for the truck indirectly enables a total saving of 3400 lb. to be made over the standard type with large wheels, 740 lb. of this saving being in the smaller axles and 1200 lb. being due to the smaller wheels. Elliptic springs are used, these resting on a spring plank supported by 15-deg. swing links from the transoms, and it is reported that the arrangement makes the low-floor car actually ride more easily than the standard types, even in high-speed suburban service, where several of the cars of low-floor design are used.



LOW-FLOOR CAR—GROUPING OF MOTORS FOR CONTROL

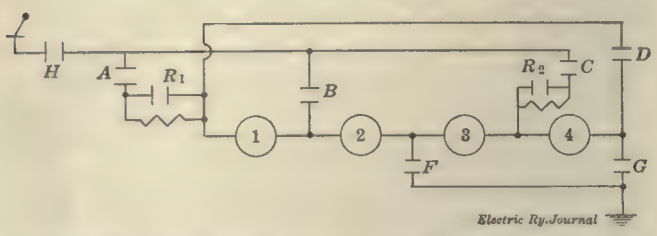
The electrical equipment consists of four GE-247-A, 35-hp motors with Jones control built by the General Electric Company under the Jones-Welsh patents. The control differs from that used on the earlier low-floor cars in having a new type of unit switch, this being of the armature type instead of the plunger type. The contactors are arranged in two switch-group cases, the reduced size making it easy to find a place for the groups beneath the low floor of the car. The combinations and connections provide for the use of interlocks on the contactors to establish holding circuits whereby the motors are maintained in parallel groups while the control handle is being thrown off, thus affording a closed path of low resistance for the discharge of magnetic energy. In this way burning of the contactor tips is greatly reduced since the contactors act as commutating switches, and with the exception of one or two units have very little actual rupturing of the current to do.



LOW-FLOOR CAR—VIEW AT CENTER ENTRANCE, SHOWING DOUBLE-DOOR ARRANGEMENT

LOW-FLOOR CAR—INTERIOR VIEW, SHOWING CENTRAL LOCATION OF FARE BOX

Contactor Sequeuce									
Step	A	B	C	D	F	G	H	R_1	R_2
1	●					●	●		
2 ○	●					●	●	●	
3	●				●		●	●	
4 ○	●			●	●		●	●	
5.	●		●		●		●	●	
6	●		●		●	●	●	●	●
7		●	●		●	●	●		●
8 ○		●	●	●	●	●	●		●
○ Running Points									



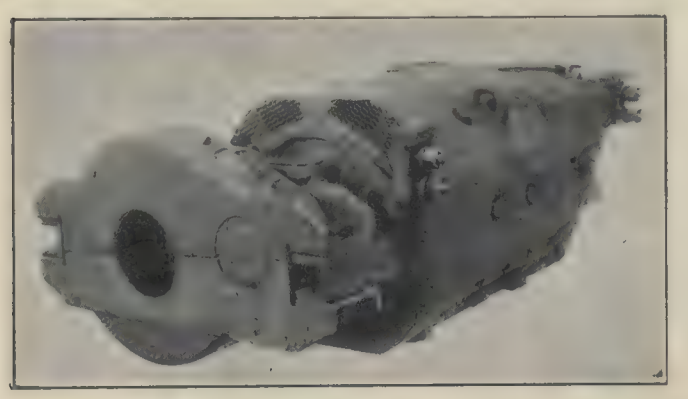
LOW-FLOOR CAR—SCHEMATIC DIAGRAM FOR CONTROL AND SEQUENCE OF SWITCHES

There is also provided a method of cutting out damaged motors by use of the control circuits which simplifies the car wiring.

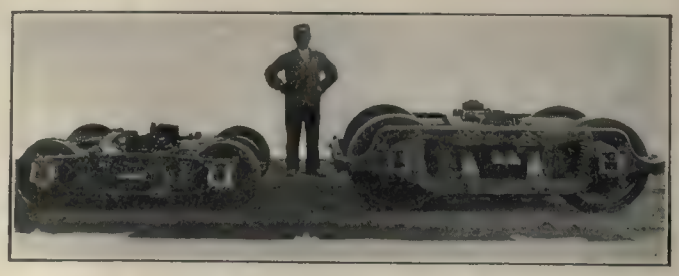
In this control system resistance is used only on two transition points or when all four motors are in series and when the first motor is thrown in parallel across the line. In the original control system only two motors worked on the transition points, whereas the above plan shows never less than three from the series-parallel position to the final position. By the use of an additional contactor, three or more motors can be used throughout the entire range, but in practice this has been found unnecessary for the first part of the accelerating period. It should be said that a few of the controllers with the original connections are still in service and work very well except that the acceleration is not as rapid as with the new scheme.

Since there are three running notches, the transition points are used only for very short intervals. It is found that the motormen make frequent use of the first running notch with all the motors in series, when behind slow-moving wagons, and the power, therefore, is not continually thrown on and off. This saves controller fingers, brakeshoes, wheels, current, and last but not least, nerve force of the passengers.

Three extremely hilly routes in Pittsburgh have been equipped with the low-floor cars, and it is found that the current consumption is approximately the same as when the same number of small-capacity single-truck cars were in operation on these lines. Tests lasting for about two and one-half months show that this control



LOW-FLOOR CAR—VIEW OF MOTOR FOR 24-IN. WHEELS



LOW-FLOOR CAR—RELATIVE SIZE OF LOW-FLOOR AND STANDARD TRUCKS

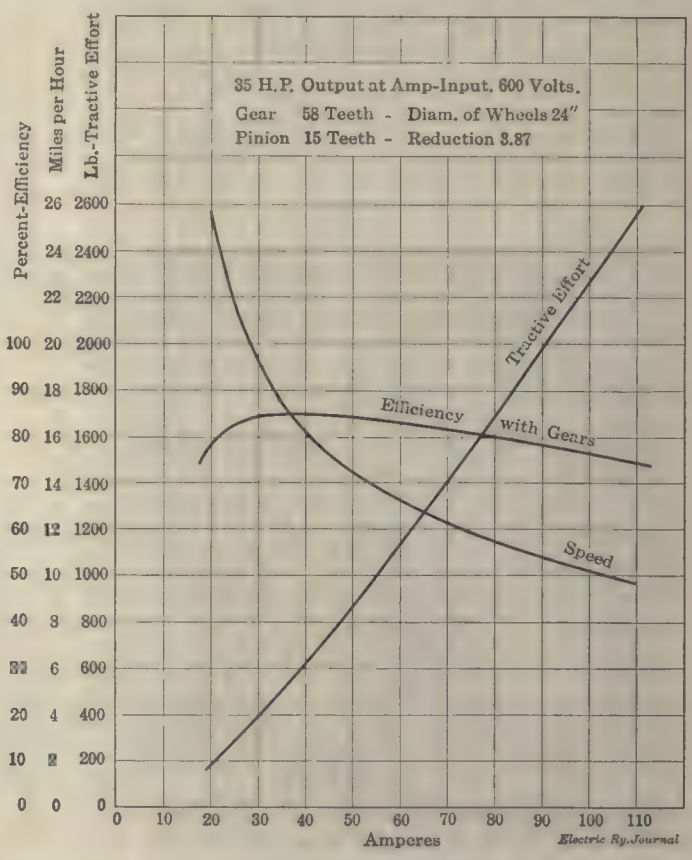
takes from 8 per cent to 15 per cent less power than with the standard, resistance-type, series-parallel control when used on cars of the same weight. The amount of saving, of course, depends largely upon the number of stops per mile. The design of the resistance and the smaller capacity of the motors, it may be said, help to reduce the car weight.

One other feature of the car is a new type of compressor which was specially designed by the Westinghouse Air Brake Company to fit the available space and to reduce the vertical height occupied to the absolute minimum.

DESIGN OF LOW-FLOOR MOTOR

Naturally, the development of motors small enough for use with 24-in. wheels has raised some question as to the methods by which this most important step toward efficient operation has been made. As a matter of fact, in the design of the low-floor motors nothing has been skimped to save weight, and the construction has been worked out along normal lines, the designers utilizing all of the latest available knowledge about railway equipment to produce the best results consistent with generally accepted practice.

This is indicated in the following table, which shows that there is nothing in the new design that is greatly



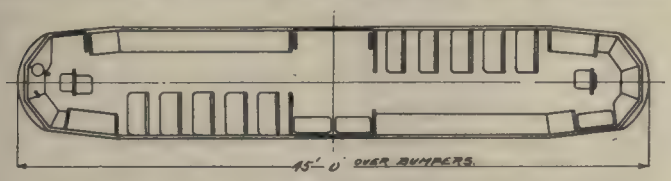
LOW-FLOOR CAR—CHARACTERISTIC CURVES OF MOTOR FOR 24-IN. WHEELS

different from the electrical and mechanical features of the older types of motors. The new type, which is known as the GE-247 motor, is of the same rating as the old standard GE-81, and on this basis may be compared with it. The field windings of the two motors cannot, of course, be compared because the GE-81 motor is a non-commutating-pole machine while the GE-247 motor has commutating poles. The armatures, however, are wound with exactly the same number of turns per coil. In both cases the air gaps are normal, being eccentric, and they should not vary from each other more than 1/64 in. The new motor, also, is ventilated, whereas the older one is not. This feature has naturally increased its relative hourly rating and has given it as well a high continuous ampere capacity.

COMPARISON BETWEEN LOW-FLOOR MOTOR AND STANDARD MOTOR

	GE-247	GE-81
Rating 600 volts	35 hp	35 hp
Rating 500 volts	30 hp	30 hp
Clearance under frame:		
30-in. wheels	....	4⅜ in.
24-in. wheels	3 5/16 in.	....
Speed (500 volts, 55 amp)	605 r.p.m.	610 r.p.m.
Diameter of armature	10½ in.	11½ in.
Number of slots	27	29
Turns per coil	3	3
Length of commutator	2¾ in.	3 in.
Thickness of shell	7/16 in.-1⅛ in.	½ in.-1¼ in.
Diameter of armature shaft	2¾ in.	2¾ in.
Weight with gears and case	1750 lb.	2020 lb.

Summed up it may be said that the 24-in. wheel, with all of its inherent advantages in reduced weight, has been made possible mainly by the adaptation of commutating poles and ventilation to a small-size motor, together with a reduction of 1 in. in clearance



LOW-FLOOR CAR—PLAN SHOWING NEW SEATING ARRANGEMENT

under the motor frame. Aside from these features the considerable saving in weight and size has been effected without departing in the least from the substantial mechanical design of standard motors. The efficiency tractive effort and speed curves are shown in an accompanying diagram.

DETAILS OF CONSTRUCTION

It should be said also that part of the saving in weight has been obtained by the use of the box type of frame. This has for long been considered necessary for large motors, and its adoption for a motor of this size is a perfectly logical step. The box frame of the new motor is approximately octagon in transverse section, and has the four main exciting poles located at angles of 45 deg. to the vertical. Bails are cast on the frame for handling the motor, and brackets are provided for bar suspension. A large opening is provided over the commutator, this being closed by a pressed-steel cover held in place by a cam locking device. The frame heads have auxiliary oil wells, and drain pockets for oil thrown off by the oil deflectors on the armature shaft. All covers on the axle and armature-bearing oil boxes have deep lips and are lined with thick felt held in place by rivets and washers, a sheet steel dustguard inclosing the axle between the axle caps. Provision is made for a 4-in. diameter of axle in the axle linings and for linings 7 in. in length. The gear case is made of sheet steel, each half being pressed from a single sheet, and it is supported by a horn cast on the axle cap at the pinion end.

The exciting pole pieces are built up of laminations assembled on keys which are bolted to the frame by tapped bolts inserted from the outside. The commutating pole pieces are drop forgings. The mummified type of coil is used for both main and commutating field coils, the insulation following standard General Electric practice in all respects. The exciting coils are held against steel pads by spring angle flanges, and the commutating coils against finished seats in the frame in a similar manner.

The armature, of course, is built up of laminations assembled on and keyed to the armature shaft, longitudinal ventilating ducts extending through it and through the commutator shell and armature heads. The commutator is 9⅛ in. in diameter and is built up of hard-drawn copper, insulated with mica grooved out to a depth of 3/64 in. below the surface of the commutator. The bars are insulated from the shell by cones of mica pressed to shape, the whole being pressed together hydraulically before the locking nut is tightened up. The insulation of the armature coils, hot banding, etc., and the brush-holder design also follows standard General Electric practice.

Ventilation is effected by a double or multiple fan which is made integral with the pinion-end armature head and which draws air into the motor through hooded openings provided in the commutator-end frame head. The air divides into two streams, one passing over and around the armature and field coils, the other taking a parallel path through the ventilating ducts in the commutator shell and armature core. After passing through the double fan the streams unite and are exhausted to the atmosphere through screened openings in the frame. By this means a positive circulation of air is maintained through the motor, cool air coming in contact with all parts of the motor.

In designing this motor no effort has been made to reduce the weight below limits that are consistent with sufficient strength and rigidity; therefore, it is well suited to handle loads within its range of capacity. This has been demonstrated by the fact that the original motors of this general type have been in hard service for nearly two years with a low maintenance cost. In fact, approximately 500 of the GE-247 motors have already been supplied for cars with 24-in. wheels, and all of them at the present time are giving very satisfactory results in operation.

Congresses at San Francisco

Eight hundred and twenty-two conventions and congresses, whose subjects cover the activities of the world along industrial, commercial, professional and scientific lines, will meet in San Francisco and the bay cities in connection with the Panama-Pacific International Exposition during the 288 days of its existence. This is more than double the number at any previous world exposition, and to secure them practically all organizations of importance in the civilized nations of the world were thoroughly canvassed by the exposition authorities.

The attendance at each of the conventions and congresses will range from 100 to possibly 30,000 delegates and visitors. There will be an average of nine exposition conventions per day throughout the entire period. But few days are blank, and on certain days during the summer months as many as thirty or forty meetings of various kinds will be held.

Following are the classifications geographically and the popular months: national conventions, 525; international congresses, 57; Pacific Coast conventions, 68; California conventions, 172. August is the month during which the largest number will be held, namely 249. July follows with 133, and September with eighty-six.

Pacific Claim Agents' Convention

Abstracts Are Given of Six of the Papers Presented at the Annual Meeting of the Pacific Coast Claim Agents' Association—Result of the Election of Officers

The seventh annual meeting of the Pacific Coast Claim Agents' Association was held in San Francisco on June 24-26. There was a full representation from member companies. The sessions were notable for the number of very able addresses and papers presented. One of these was published in abstract in the issue of this paper for last week, and abstracts of others appear this week.

At the meeting on June 26 officers were elected as follows:

President, Thomas G. Aston, claim agent Washington Water Power Company, Spokane, Wash.

First vice-president, Thomas A. Cole, claim agent Los Angeles Railway Corporation, Los Angeles, Cal.

Second vice-president, W. H. Moore, San Diego Electric Railway Company.

Third vice-president, J. S. Mills, assistant superintendent Key Route, Oakland, Cal.

Secretary and treasurer, H. G. Winsor, claim agent Tacoma Railway & Power Company, Tacoma, Wash.

Executive committee: J. H. Handlon, claim agent United Railroads, San Francisco, Cal.; A. M. Lee, assistant general claim agent Northern Pacific Railway, Seattle, Wash.; B. F. Boynton, claim agent Portland Railway, Light & Power Company, Portland, Ore.; George Carson, claim agent Puget Sound Traction, Light & Power Company; H. K. Relf, general claim agent Spokane, Portland & Seattle Railway, and S. A. Bishop, general claim agent Pacific Electric Railway, Los Angeles, Cal.

Tacoma was chosen as the place for next year's convention.

THE INVESTIGATOR AND HIS WORK

BY C. F. YOUNG, ADJUSTER PUGET SOUND TRACTION, LIGHT & POWER COMPANY

The investigator, to my mind, is next in importance to the claim agent or adjuster. Loyalty, of course, is one of his first requirements. He should be above the average degree of intelligence and come within the most critical definition of the term gentleman. Then his personality should be pleasing, and he should approach people in a manner to inspire confidence. He should also be a good listener, be able at once to impress upon the witness his fairness in the case in question, and fairly to influence an obstinate or prejudiced person. He should be honest in all things, clean morally, dress neatly but not overdress, as his work requires him to meet all classes. He should be particular when calling upon people below him in rank not to talk over their heads. He should hold his temper always, but by so doing not let the other fellow imagine he is afraid.

He will find cranks and critics in many places, as well as scores of people with complaints, real or fancied, and to these he must be able to make answer without provoking an argument. Many times, the fact of calling attention to the difficulties of operation or the tribulations of the trainmen in dealing with the public and endeavoring to please all, will be of material help in effacing prejudice and creating a friendly attitude. A good way out of many such incidents is for the investigator to explain that the claim department has nothing whatever to do with the operating end but that he will be pleased to call attention to the complaint or suggestion, and in this way many timely suggestions have been so made and reported to the proper department.

The investigator should be sufficiently acquainted with the subject under investigation to know what he is seeking and recognize it when he sees it, thus cutting out all suppositions and embodying in his statement positive facts to which the witness could testify if called upon the stand later. A reasonably short, clear statement covering the facts will help to save much of the time of the witnesses, most of whom are disinterested and conferring a favor upon him.

The investigator should be on the best of terms with all other employees, so far as is possible, and especially with heads of departments. His treatment of trainmen should be such that they may look upon him as a friend trying to build up a defense not only for the company but for the man or men who have had the accidents. If he has established this feeling he will secure many good tips from them.

He should be able to use a camera to secure pictures of conditions at crossings, landings, steps and platforms as well as street intersections, thus having evidence which is hard to refute months or years later in a suit, when conditions may have changed.

THE ORGANIZATION OF PUBLIC SAFETY COMMITTEES

BY B. F. BOYNTON, CLAIM AGENT PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.

After years of work along safety educational lines with our trainmen in Portland in the public schools, and in various other ways, we began to receive letters from all over this country and foreign countries inquiring about the methods and results of our work. We began to feel we had really accomplished some good in eliminating accidents, as we had reduced the number of accidents on our own property about thirty a day. One day I called on the Mayor and showing him the documents we had received from the various cities and countries, I told him I thought that a public safety committee, backed up by prominent men in our city, could accomplish a great deal toward making Portland the safest city in the world. The Mayor thought the suggestion a good one and appointed a committee consisting of nine bureaus, as follows:

Bureau of public safety—John T. Moore, captain of police.

Bureau of fire prevention—A. M. Churchill, lawyer and chairman of fire prevention bureau of Civic League; E. F. Dowell, chief of fire department, and Jay Stevens, fire marshal.

Bureau of traffic—H. P. Coffin, chairman public safety committee of Portland Automobile Club, and A. S. Kirkpatrick, city traffic engineer.

Bureau of schools—L. R. Alderman, superintendent of schools.

Bureau of transportation—F. L. Burckhalter, general superintendent Southern Pacific Railway.

Bureau of electric transportation—B. F. Boynton, general claim agent Portland Railway, Light & Power Company.

Bureau of industrials—M. N. Dana, *Evening Journal.*

Bureau of buildings—R. L. Withrow, *Evening Telegram.*

Bureau of publicity—H. E. Thomas, city editor *The Oregonian.*

Advisory board—G. W. Talbot, president Pacific Power & Light Company; F. C. Knapp, Peninsula Lumber Company, and A. H. Averill, Averill Machinery Company.

These men, you will see by the positions they hold, are representative men in representative positions. Each man has his branch of work to cover.

The first public step, after our organization, was to get our fire marshal, Jay Stevens, to go in full firemen's uniform, with H. P. Coffin, chairman of our public safety committee at the present time, and myself, to our various public schools throughout the city and talk to the children on fire prevention. Mr. Stevens, being a very interesting and entertaining talker, was received at all the schools with great enthusiasm, and we have a record at the present time of having saved two schools and a great many lives as the result of Mr. Steven's talks. At the time he started his school lectures many false fire alarms were being rung in every day, which not only cost about $25 each to answer, but introduced an element of danger from the heavy fire apparatus plunging through the streets at breakneck speed. He showed in his talk to the school boys that the fire engines, in answering one of these false alarms might collide with a street car, injuring the firemen and possibly the boy's own mother in the street car. This caused all the boys to think. They stopped turning in false alarms, and to-day a false alarm is a rarity in the city of Portland.

For a number of years I have been gathering different safety data and safety propaganda of every description from all over the world; in fact, I have quite a large room in our building given over entirely to a safety-first exhibit. To impress the members of the Commercial Club and Portland's citizens with what was being done along safety lines, I had this entire exhibit moved to the dining room of the club, and on the occasion of our first general meeting there we invited a number of representative employers to attend. The enthusiasm and interest displayed at that meeting has ever since been growing. We held other meetings at the Commercial Club, which was then Portland's representative business organization. Every meeting has been largely attended.

Within the past few months our Commercial Club and Chamber of Commerce and other large clubs have combined into one organization, namely, the Chamber of Commerce, thus making an organization of approximately 5000 members. The new Portland Chamber of Commerce in its budget just prepared, has made a very liberal allowance for carrying on the safety work.

Since the establishment of the public safety committee, our city has appointed a public-safety man. This gentleman, A. S. Kirkpatrick, has installed between 300 and 400 caution signs at dangerous points all over the city. They are steel disks 18 in. in diameter, mounted on steel tubing 6 ft. high, painted red with a green center, and are set in concrete just inside the curbing on the right-hand side of the street at various distances from danger zones, warning the drivers of teams and machines of the condition ahead. "Sharp Turn," "Steep Grade," "Railroad Crossing," "School, Drive Slow," "Fire Station," "Reverse Curve," "Hospital," and other warnings are painted on these little disks.

Up to May 1 our public safety committee had 153 automobile drivers arrested (and most of them were fined) for disobeying the traffic ordinance in passing street cars while the latter were discharging passengers. Before the organization of the public safety committee many passengers were knocked down and injured in this manner, but now, when a street car stops, no matter how many machines there are behind it, they all throw in the reverse and come to an immediate stop.

Our fire marshal has appointed a number of deputies, who all wear regulation fire inspector's uniforms. Every building in the city of Portland is being examined by him or his deputies for fire hazards, and we expect to carry out just as thorough work through every branch of industry, and in so doing solve through education the greater portion of the accident problem. I find that by being liberal enough to take an interest in the other phases of safety work than that which directly affects the company I represent, a feeling of desire to reciprocate and help us is created among all classes of people in a way that could not possibly have been done in any other manner.

THE EMPLOYMENT BUREAU

BY H. G. WINSOR, GENERAL CLAIM AGENT PUGET SOUND ELECTRIC RAILWAY AND TACOMA RAILWAY & POWER COMPANY

There are many types of applicants for employment but comparatively few can be classed as eligible. The process of elimination quickly disposes of such as the man who cannot afford time for proper instruction; or the one who is always financially embarrassed; or the man who is a "globe trotter" and has a pocket full of service letters; or the man who can tell his instructors just how the work should be done. We have no use for the man who is dissipated or naturally uncouth in appearance, and above all, we should shun the man who expects to secure a position through political influence.

On the other hand, the employment official of experience and mature judgment will quickly recognize probable merit in the following types:

1. The man who presents a desire to undertake the work without condition, depending entirely on his personality for favorable consideration.

2. The man who presents himself at an hour which he selects as being most convenient for the employment official and enters the office in a respectful manner.

3. Those having seen honorable service in the army and navy. Such men usually make satisfactory trainmen as their experience teaches discipline and loyalty.

The employment of men should be undertaken by one who is a good judge of human nature. If so, he can find out many of the defects of an applicant at a single interview. "Make haste slowly" is a splendid maxim for adoption by employment officials. Many an applicant who has the ability and personality to "make good" and a spirit of loyalty which would recommend him after deliberation has been disheartened and lost to the service through an abrupt, indifferent or discourteous reception of his application for employment.

Two important essentials for employment are character and physical fitness for the duties required. The investigation of an applicant's history is usually obtained through references and is often incomplete so that the employer's ability to judge finds its value in this regard. Physical fitness is determined by a medical examination, and such examinations should be thorough and complete.

A man who has had experience in public service work requires fully as close scrutiny as others, and it is a mistake to assume that his record is a passport to employment. Courtesy should be an absolute requirement. If a man applying for employment walks into your office unannounced, if he fails to remove his hat, places his feet on the table or other furniture, he should be courteously told why he cannot have a trial. When you are engaged in a personal interview with an applicant, and he volunteers the information that at the last place he worked he could have remained had he ap-

proved of the methods or systems used by his former employer, you may reasonably question his loyalty. Men under twenty-five and over forty-five years should not, as a rule, be considered, although there are exceptions. Trainmen under twenty-five lack experience and are likely to assume too great risk, while the man over forty-five, unless he has had previous experience, is hardly likely to make a satisfactory record.

Nearly all electric railways employ one or more experienced officials whose special duty it is to prepare the motorman student by instruction and demonstration for his work at the controller. To facilitate this work a dummy car fitted with the necessary appliances is often provided. When the instructor is satisfied that the student is competent he is sent out on the different lines for instruction by experienced trainmen in the actual operation of cars. From ten to fifteen days is usually consumed in this preparatory work. When the student is employed as a conductor he is instructed in practically the same manner, although along somewhat different lines. Oral examinations are always necessary to determine the advancement made by students and to satisfy the operating department of their growing efficiency.

From the information at hand it has been rather surprising that very few companies require a written examination. In our organization the conductor's examination blank contains eight-four questions pertaining to operation and thirty-two pertaining to accidents and accident prevention; the motorman's blank has 123 questions on operation and thirty-seven on accidents. So far as the effect of this system concerns our claim department it has been of material assistance in reducing the number of accidents as well as assuring complete and satisfactory reports.

SERVICE RECORD OF TACOMA RAILWAY & POWER COMPANY

	Trainmen Entering Service				
	Conductors	Motormen	Total	Experienced	Re-employed
1912	189	109	298	41	No record
1913	155	82	237	49	8
1914	69	39	108	18	22

	Trainmen Leaving Service				
	Resigned		Discharged		
	Conductors	Motormen	Conductors	Motormen	Total
1912	108	59	80	24	271
1913	98	59	50	21	228
1914	53	42	32	11	138

Final instructions should be given by the employment official who selects and employs the applicant, and when this important duty is performed he should have before him a complete history of the man, gathered from the various sources at his command. Any criticism of his work or examination should be pointed out in a kindly but impressive manner.

Employees who remain in the service for a number of years are usually those who are interested in and have a liking for the work. These are the most desirable men, and every effort consistent with good policy should be made to encourage them. Employees should have as much recreation as possible consistent with their duties and the condition under which they are employed. Comfortable quarters with good light, good ventilation and toilet facilities should be provided, as should also reading matter of the right character. Good reading matter is always appreciated and easily furnished. Frequent visits by the company officials to the quarters of the men will likely result beneficially. An employee desiring to make complaint should be courteously received and his request promptly considered. The report of an employee's sickness or death should mean prompt action on the part of his immediate superior. Occasional entertainments for the benefit of the employees and brief discussions are sometimes used as a means of keeping up an interest in certain parts of the work. The organization of benefit associations has worked satisfactorily in some cities and much good results to both employee and employer if such an association is properly organized and managed. We believe that through welfare work many valuable men have been retained in our services. To support that contention, a record of trainmen entering and leaving the services of the Tacoma Railway & Power Company for the years 1912-1913-1914 is presented in the accompanying table.

The profit and loss account of a company is affected materially by necessary settlement of claims brought by reason of the acts of its employees. In the organizations which I represent the claim department is not only consulted and its approval required before a student is assigned to regular duty, but no trainmen is discharged without a conference of the superintendent of transportation and the claim agent. All examination papers and other records are submitted for the guidance and the assistance of the claim department, and all students are sent by the superintendent to receive advice and instructions in safety and accident work from the claim agent.

INVESTIGATION AND HANDLING OF COLLISIONS WITH PEDESTRIANS AND VEHICLES OTHER THAN AUTOMOBILES

BY THOMAS G. ASTON, CLAIM AGENT WASHINGTON WATER POWER COMPANY, SPOKANE, WASH.

All accidents should be investigated carefully. For example, in a recent damage case on our road two persons were sitting in cars going in opposite directions. Each had a left arm projecting from a window, and as the cars passed the arms were interlocked, causing both to be broken. The contention was that the cars scraped together while passing in a curve. One of the witnesses asked at the time of the accident to have the cars backed up together and made a measurement which proved that there was plenty of space between, and the investigation at the time showed that there were no marks on either car.

The car men should be instructed to make note of the exact place on the street where an accident occurs and should call it to the attention of witnesses, who should be placed on record as to the exact point. Witnesses should be asked to mark the point at which an accident occurs by some immovable object. This may assist in proving that the driver was on the wrong side of the street, or in the act of turning the corner in violation of the traffic ordinance, or that the accident occurred between blocks instead of on a crosswalk or at an intersection.

Measurements should always be made and photographs should be taken of the scene of the accident as soon as possible. The car and vehicle involved should also be photographed, bringing out all marks. This will establish the amount of damage and show the parts which came in contact, thus helping to prove whether the vehicle had just pulled onto the track or had partly crossed. I recall several cases where photographs were of considerable value to us.

If an accident is serious it is our policy forthwith to have an engineer's map made of the location and vicinity, showing all houses from which any person could have viewed the accident. The grade and height of rail should also be shown. After the map is made an investigator should canvass every house shown thereon and take statements from at least one person in each house to ascertain whether or not anyone in the house claims to have seen the accident. That this is a good practice was taught to us in a very serious case involving the death of a driver of a vehicle. Two persons living about half a block from the scene of the accident testified to having seen the accident, and that no

warning was given. To my mind they did not see the accident or car until after everything was over, and I believe that they would have made a statement to that effect had they been interviewed at the time of the accident or shortly afterwards.

THE MEDICAL DEPARTMENT

BY GEORGE CARSON, GENERAL CLAIM AGENT PUGET SOUND TRACTION, LIGHT & POWER COMPANY

The value of the medical department to the claim department is derived from the aid rendered, in handling the situation properly, after the accident has occurred, although the medical department sometimes may be able to offer suggestions of a kind that might tend to prevent accidents. The physician of a railroad should regard himself and his department as an exceedingly large and important factor in the work of the claim department, and should aid whenever possible in the saving of expense of that department in a proper way.

In so far as the handling of accidents is concerned, prior to the time the claim is adjusted or rejected, the medical department should act under the general direction of the claim department in regard to calls on the injured person, examinations, reports, etc. This, of course, in no way refers to matters of a strictly medical nature, as, for example, medical treatment of injured persons, such not being within the province of the claim department. Neither should the medical department interfere in any way in that which is strictly claim department work, such as legal investigations, adjustments, etc.

The physician representing a railroad as the head of the medical department and his assistants should be gentlemen of the highest standing and ability in their profession. Their ability should be such as to enable them to detect the accident faker and malingerer, making it impossible for them or unfair physicians to "pull the wool over their eyes." The company physician and his assistants should be of pleasing personality and should be capable of inspiring confidence in injured parties when first visiting. They should be within call at all hours of the day and night, to respond promptly to emergency calls and render first aid when necessary.

As thorough an examination of the injured party as may be consistent with the conditions should be made at the first visit, and under no circumstances should the injury be minimized. If there is any element of doubt as to the extent of the injury, it would be better to resolve such doubt in favor of the injured party. Any departure from this policy might result most disastrously to the company. Since medical reports are the basis upon which settlement is made, particularly in cases of liability, failure to discover a bad condition of the claimant, if such existed, would easily bring about failure to reach a settlement and result in a costly lawsuit. In making an examination of an injured person it is exceedingly important that the examination be thorough, if only for the purpose of satisfying the party of its thoroughness, otherwise the claimant will say to me that our physician had not made a thorough examination and therefore could not tell how he was suffering.

At the time of making the examination, if the condition of the patient will permit, the company physician should get, so far as is possible without offending or antagonizing the injured party, his complete history, including details relating to any accidents he might have previously incurred. Promptly after the examination has been made, a full and complete report should be sent to the claim department. Better reports, I think, can be made on blank sheets than on printed forms.

If at the time of the call of the company's physician on the injured party the family physician has not been called, the company's physician should ask the party whether treatment is desired by him or if the family physician would be preferred. If the injured party desires continued treatment by the company physician, such treatment should be rendered, but no effort whatever should be made to induce the injured party to continue treatment with the company physician, and such treatment should be rendered only when entirely agreeable to the injured party. If the family physician or an outside physician should be called in a case, pending its disposition, the company physician should keep in close touch with the injured party, either by consulting with the attending physician, or by examinations, keeping the claim department continually advised of the situation from every possible angle within his observation, including information as to whether or not the attending physician of the injured party is disposed to be fair, etc.

When visiting the injured party, the company physician, if tactful and diplomatic, can do a great deal toward paving the way later for the claim agent or adjuster to make a reasonable settlement. This many times is of great benefit both to the injured party and to the company.

When persons are injured in connection with our cars to an extent making it necessary for them to have hospital treatment, no particular hospital should be selected. The injured person should be taken to the nearest hospital where proper attention may be secured, or to any hospital that he might prefer. In a case of no liability and the injured person has no preference, then he should be sent to the city hospital for the purpose of saving expense to the company. The latter, however, would be a matter to be passed upon by the claim or operating departments, as the company physician is not supposed to know anything about liability.

When it becomes necessary from the viewpoint of the company physician to employ a specialist, who as a rule is not on a regular salary, the company physician should first ascertain whether the claim department is desirous of incurring the expense, as many cases might arise in which the company would not derive any benefit from a specialist's examination.

THE INVESTIGATING AND HANDLING OF AUTOMOBILE ACCIDENTS

BY H. H. BENTON, DISTRICT CLAIM AGENT NORTHERN PACIFIC RAILWAY, SEATTLE, WASH.

The phrase "Stop, look and listen," when applied to vehicles at grade crossings, can hardly be considered a safe rule of law for the claim agent. The true rule is this: the driver of the vehicle "must act with such care and caution for his own safety as a reasonably prudent man would be likely to do under like conditions."

For example, if a driver's machine is comparatively noiseless and does not materially interfere with his power to hear an oncoming train he may fail to stop and yet not necessarily be negligent. He should look and listen, but if looking and listening could avail nothing, his failure to do the useless thing would not necessarily bar his right of recovery if a negligently operated train collided with his automobile.

With these rules of law affecting the possible liability of the railway company firmly fixed in his mind the claim agent, in the investigation of such a collision, should obtain all available evidence as to the negligence or carefulness on the part of the railway company, either as to the safe or dangerous character of the location and construction of its road, and the crossing itself.

The speed of the automobile and of the train should be investigated in order clearly to demonstrate where each one was at successive intervals preceding the moment of the collision. This opens the way for the application of the rule of law closely held by the courts that if the driver could plainly see he will be held negligent if he did not see. Again, it is important to note the location of the railway line near the crossing, to determine whether the roar of an approaching train would be likely to be muffled or lessened. The condition of the weather at the time of the accident is always important. Storms may impede sight, wind may smother sound; either may tend to make some acts negligent, or tend to excuse other acts which would under other conditions be negligent.

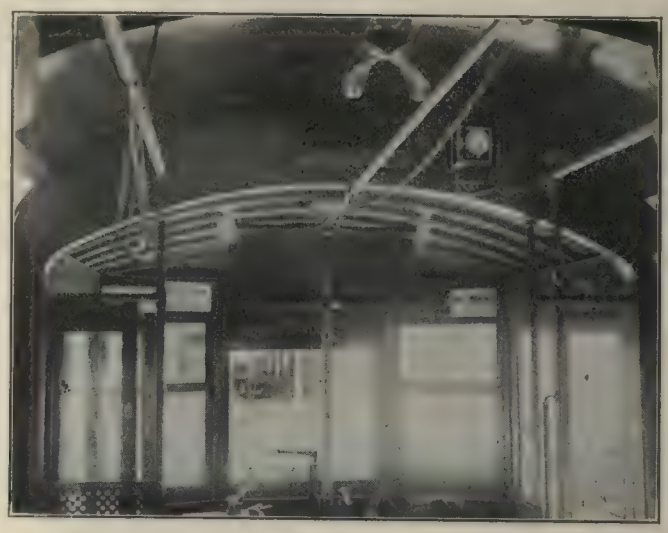
The average chauffeur boldly claims that he can stop his machine, when running at 12 m.p.h., within a distance of 4 ft. This is absolutely untrue when applied to conditions under which collisions occur. At a speed of 12 m.p.h. his machine travels 17½ ft. in one second, so that while descending into a cut at a grade crossing where the view of an approaching train might be obstructed, the chauffeur, when 25 ft. from the track, suddenly beholds the rushing train, he only has one and a half seconds to come to a stop. He imagines that 25 ft. is all that he needs, but he is mistaken.

Following Up Watt-Hour Meter Records at El Paso

Both Meters and Methods Have Stood Up Well After Nearly Four Years of Service

The El Paso (Tex.) Electric Railway began the use of Sangamo watt-hour meters in December, 1911, equipping at that time every one of its fifty motor cars. Since then fifteen meters have been added to new equipment, making a total of sixty-five motor cars.

The energy consumption savings were first presented by George G. Morse, superintendent railway department, before the Southwestern Electrical & Gas Association at its 1914 meeting (see the ELECTRIC RAILWAY JOURNAL for May 30, 1914, page 1,206). Mr. Morse showed that an average energy consumption of 2.61 kw-hr. per car-mile in 1911, without meters, had been reduced to 2.39 kw-hr. shortly after the installation of the meters. These averages, it should be stated, were readings taken at the d.c. busbars, therefore including all low-tension distribution losses. As the result of continued competition and the follow-up system, the energy consumption for the entire system is still (April, 1915) at 2.39 kw-hr. per car-mile, despite the addition of fifteen double-truck cars, which, of course, are heavier than the single-truck cars which formerly carried most of the business. In fact since the meters were first installed, the proportion of double-truck mileage has risen from 43.2 per cent in 1911 to about 54 per cent in 1915.



EL PASO CAR METERS—INSTALLATION OF WATT-HOUR METERS ON INSIDE ARCHWAY

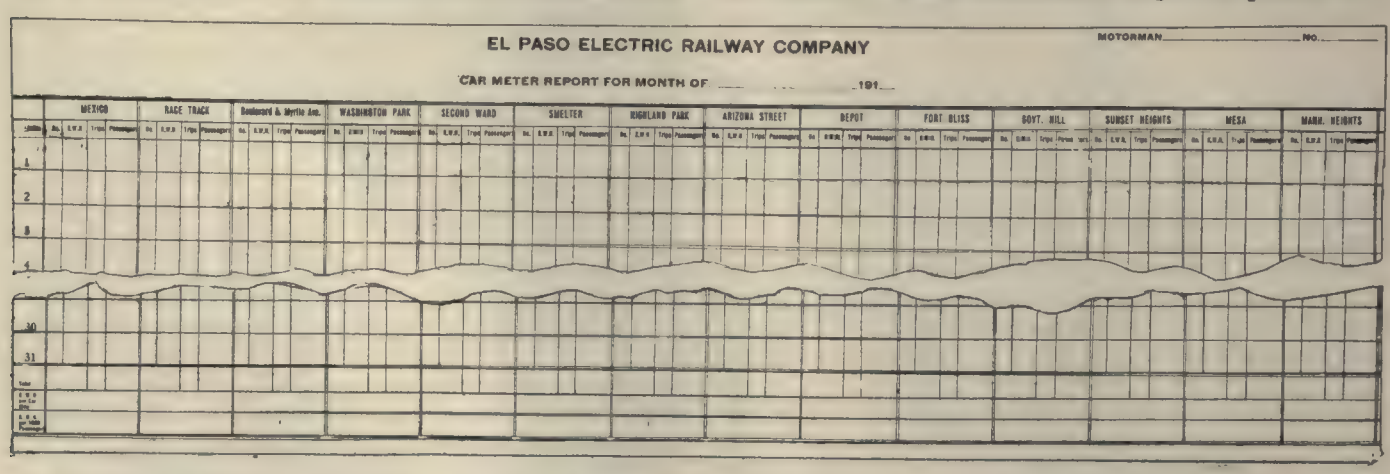
As stated in Mr. Morse's original paper, a bogey or standard was set up, after test, for each of the four classes of cars. This bogey plan still forms the basis of the follow-up system. In Mr. Morse's opinion, faithful adherence to the follow-up system is much more important than the type of checking device used on the car.

FOLLOW-UP RECORDS

The records begin with the meter slip made out by the motorman. On taking a car out, he takes and records his first meter reading. At the end of his work on that particular line he gets from his conductor the number of passengers handled. This record also shows the line on which he ran, the number of trips made (the mileage being figured later by the mileage clerk) and the car number. These motorman's slips are padded in a

Meter Reading WHEN LEFT 73003
Meter Reading WHEN TAKEN 72885
AMOUNT USED 118
Register Reading WHEN LEFT 51817
Register Reading WHEN TAKEN 51537
TOTAL PASSENGERS 280
NO. OF TRIPS 30
LINE RUN ON Sunset
CAR NO. 39
DATE 4/18/15
NAME Hazelhurst NO. 316

MOTORMAN'S METER SLIP; A DUPLICATE STUB IS RETAINED IN HIS BOOK



EL PASO ELECTRIC RAILWAY COMPANY

CAR METER REPORT FOR MONTH OF ____ 191__

MOTORMAN ____ NO. ____

Dates	MEXICO				RACE TRACK				Boulevard & Myrtle Ave.				WASHINGTON PARK				SECOND WARD				SMELTER				HIGHLAND PARK				ARIZONA STREET				DEPOT				FORT BLISS				GOVT. HILL				SUNSET HEIGHTS				MESA				MANH. HEIGHTS			
	No.	E.W.H.	Trips	Passengers	No.	E.W.H.	Trips	Passengers	No.	E.W.H.	Trips	Passengers	No.	E.W.H.	Trips	Passengers	No.	E.W.H.	Trips	Passengers	No.	E.W.H.	Trips	Passengers	No.	E.W.H.	Trips	Passengers	No.	E.W.H.	Trips	Passengers	No.	E.W.H.	Trips	Passengers	No.	E.W.H.	Trips	Passengers	No.	E.W.H.	Trips	Passengers	No.	E.W.H.	Trips	Passengers	No.	E.W.H.	Trips	Passengers	No.	E.W.H.	Trips	Passengers
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EL PASO CAR METERS—MONTHLY COMPARATIVE RECORD OF METER PERFORMANCE ON A SPECIFIC TYPE CAR AND ROUTE

EL PASO ELECTRIC RAILWAY COMPANY

INSPECTOR'S METER DATA

Your attention is called to the performance of the following men, made on April 29, 1915.

Line	Name	No.	Car	Performance		Notes
				Actual	Bogey	
Mexico	Broderson	66	80	12.20	7.25	
	Reynolds	78	79	8.05	7.25	
	Scrivenor	184	71	8.05	7.25	
	Dieterich	80	81	9.00	7.25	
	Weaver	114	79	8.20	7.25	
Park	Heard	132	93	12.40	10.50	
	Wilcox	84	92	11.70	10.50	
	Glaves	126	88	12.00	11.50	

Remarks:

EL PASO CAR METERS—RECORD OF DELINQUENTS SENT TO INSPECTORS ON THE DAY FOLLOWING THE PERFORMANCES NOTED

book in duplicate, so that the user can keep the stub for his own information and check.

The meter slips are first examined by the meter clerk for those men who have fallen below the bogey for their class of car. These delinquents are listed as shown on a sheet called "Inspector's Meter Data." Copies of this report are in the hands of all road inspectors by 11 a.m. the next day. Therefore, the inspectors are prepared to ride and correct the operating faults of the delinquents while all concerned still have in mind all the conditions of the preceding day. For example, a heavy sand storm, as is common in the vicinity of El Paso, will clog the rails and so increase energy consumption. Another cause of increased energy is found in heavy rains which leave much sand on the track. The inspectors, naturally, exercise their judgment under conditions of this character.

Records from all slips, regardless of delinquents, are also posted on a monthly sheet which is divided horizontally by days and vertically by routes. Each route is also subdivided vertically for the car number, kilowatt-hours, trips and passengers. The total kilowatt-hours per car-mile and kilowatt-hours per 1000 passengers are written at the top. This monthly record is made out in four colors, one for each type of car.

In order to make comparisons as fair as possible, the number of passengers handled is noted, as above stated. To avoid too much clerical work, however, the comparisons are made on the basis of 1000 passengers carried with any given type of car. The factor of schedule speed does not enter, as this is the same on any given line for any given period of the day, no comparisons being made between different lines. The average schedule speed of the system is 8.1 m.p.h.

The recapitulation of the monthly record for each type of car is prepared in typewritten form, as shown, for posting at the carhouses. This report presents each motorman's name, number, kilowatt-hours per car-mile, kilowatt-hours per 1000 passengers and his relative rating. This rating is obtained by dividing each

METER PERFORMANCE—SUNSET HEIGHTS

Class D Cars April, 1915

Name	No.	Kw-hr. per car-mile	Kw-hr. per 1000 passengers	Rating
Shearer	154	1.76	388	95
Baker	196	1.83	570	98
Werner	108	1.86	445	100
Bloxom	34	1.90	585	102
Hayslett	36	2.00	420	108
Average		1.86	465	

Ratings are given on car-mile performance.
No ratings given unless the equivalent of a full day's mileage has been made.

.....
Superintendent Transportation

APPROVED:

.....
Superintendent Railway Department

EL PASO CAR METERS—MONTHLY RECAPITULATION OF DAILY METER PERFORMANCES

man's average kilowatt-hours per car-mile by the grand average of all men on the same line and type of car. The reference to passengers carried is used only where two men have the same rating on a kilowatt-hours per car-mile basis.

The interest of the men has been maintained chiefly by publishing their records, but their run privileges are sometimes modified by the nature of their performance. Before the men began to use meters they had no conception of the value of electric energy. The use of the meter has given them an entirely new point of view. Although the kilowatt-hour was an unfamiliar unit to the men, they soon became accustomed to it among themselves. However, they refer to the readings as so many "points" rather than so many "kilowatt-hours."

MAINTENANCE

The fact that these meters have now been in service for nearly four years makes the question of their maintenance cost a matter of special interest. Until recently the meters were maintained by the general meter shop of the lighting department, but they are now cared for directly by the railway department. For the year 1914, the cost of maintaining sixty-five meters was only $159.33, or $2.44 per meter. This total includes the cost of repairing six meters burned out by lightning. Outside of these repairs, the chief expense was the removal and straining of oxidized mercury through cheesecloth, the replacement of the mercury and reassembling of the meters. This purification is carried out about once in five months. The total cost mentioned also covers the expense of testing. The special calibration meter used for such testing was purchased from W. T. Mobray, Providence, R. I., at $150.

Illinois Association Trip to Milwaukee

Outing and entertainment features comprised the entire program of the Illinois Electric Railways' Association on June 25.

About eighty members and guests under the guidance of F. E. Fisher, president, and W. V. Griffin, secretary, left Chicago at 9.30 a. m. on the steamer Christopher Columbus and arrived in Milwaukee at 2.30 p. m. where they were entertained by the Milwaukee Railway & Light Company. They returned to Chicago over The Chicago & Milwaukee Electric Railway and the Northwestern Elevated Railway line.

En route to Milwaukee dinner was served in the main dining room of the steamer. After dinner, President Fisher called the members to order and impromptu remarks were made by several speakers. A vote of thanks was tendered Mr. Griffin in appreciation of his work in planning the trip.

On arrival at Milwaukee, R. B. Stearns, vice-president The Milwaukee Electric Railway & Light Company, conducted the party through the large Cold Springs shops and then through the Public Service terminal and office building of his company.

At 5 p. m. the party under the guidance of G. S. Henry, superintendent, and F. E. Low, traffic agent, left Milwaukee on a two-car train of the Chicago & Milwaukee Electric Railroad, arriving at Chicago via the Northwestern Elevated Railway at 7.45 p. m.

Ground was recently broken and the tunnel work begun on the projected electric mountain railway from the city of Bergen, Norway, to the summit of Mount Floien, the construction of which is estimated to cost $160,000. Bids for its construction and equipment were issued in January, 1915.

New York Electric Railway Association Meets

The Subjects Discussed Were Center-Entrance City and Suburban Cars, Financial Conditions, Jitneys and Interurban Highway Crossings, while Public Relations Were Considered at the Banquet

The thirty-third annual convention of the New York Electric Railway Association was held at the Oriental Hotel, Manhattan Beach, New York, on June 29 and 30. There was an attendance of between sixty and seventy at the technical sessions.

The convention was opened on Tuesday at 11.15 a. m. by President Hamilton, who delivered an annual address dealing with the present needs of the electric railways.

Mr. Hamilton referred to the extremely trying year through which the electric railway companies had passed during the past twelve months. He said that they had suffered financially along with industry generally as a result of the European war, and far more so than many industries on account of their inability to retrench to the same extent and counteract in various ways the effect of business depression. In addition, the companies had received another set-back in the form of jitney-bus competition, which has been and is still a serious menace to the industry. The electric railways are being compelled to sell transportation at a price based on service and under conditions of production of years ago. Although the traveling distance has increased vastly and the cost of production has advanced with leaps and bounds, the rate of fare has remained stationary. Jitney-bus competition and the business depression have reduced the earnings of the companies to an alarming extent, while expenses have increased to a degree which makes the 5-cent fare more and more inadequate for the actual needs of the companies. What the industry needs at this time is not "watchful waiting" but helpful action. It is all very well to theorize and discuss the many problems with which the industry is confronted and to sympathize with each other. But far more can be achieved if the companies assemble their best efforts and actively pursue fearlessly and honestly an organized campaign that will bring about the result and relief desired.

An example of effective and honorable activity is illustrated in the methods used by the association in advocating the enactment of the so-called jitney-bus bill. Thorough publicity was given to the railway side of the question, and a large number of representatives of various street railways appeared in a body at the public hearing on the bill and stated why the companies favored the legislation under consideration, in justice to all. It is gratifying to state that the bill is now a law of the State of New York. This fact indicates that the legislatures have been awakened to the fact that the interests of public service corporations must be protected to some extent, for the reason that these corporations do not exist by themselves alone but are necessary to the communities which they serve.

The report of the secretary and treasurer was then read. It stated that two companies had recently joined the association, namely, the New York & Stamford Railway Company of Portchester, N. Y., and the International Railway Company of Buffalo.

Report of Safety Rules Committee

The president then called for the report of the committee on safety rules, of which John J. Dempsey is chairman. This report was presented verbally by Mr. Dempsey. He said that the committee of the association had met at Albany with the committee of the Empire State Gas & Electric Association. Subsequently, the bureau of standards at Washington had announced that it was preparing a set of safety rules, and the committee had decided not to take any further action until a report had been rendered on the proposed rules by the committee that had been appointed by the American Electric Railway Association.

On motion of Mr. Peck the association decided to continue the committee on safety rules with instructions to review and criticise the proposed National Electric Safety Code promulgated by the bureau of standards and to act, subject to the approval of the executive committee, with the committee of the American Electric Railway Association on this subject.

Center-Entrance Car for City and Suburban Service

The paper by W. G. Gove, superintendent of equipment Transit Development Company, Brooklyn, was then presented. An abstract of this paper appears elsewhere in this issue. After Mr. Gove had read this paper he showed on the screen a very interesting collection of views of different types of cars used in Brooklyn from early days.

In referring to his paper Mr. Gove explained that the car described was designed by the company's own force and also went through the hands of others interested. Mr. Menden, chief engineer of the company, was the first to think of it and was largely responsible for its design as well as that of the new subway cars of the company. Mr. Menden had had a long experience in the transportation side of the industry as well as in the engineering side, and this was of great help to him in the design of the car. A sample car was built before the final plans were finished.

At the close of Mr. Gove's paper various questions were asked him, and the following information, among other points, was brought out: The ball-bearing center plates are kept clean by blowing them out and by using a light lubricant. They have proved very successful. Although the cars were built largely in the shops of the company, Mr. Gove does not recommend this plan as a rule, believing that better satisfaction will be obtained when cars are purchased from regular manufacturers. The plan was adopted in this case owing to a combination of unusually favorable circumstances. The cost of the car complete was about $6800 and the company is adding this year on capital account about $100, making the total cost per car about $6900. Mr. Gove estimated the life at thirty years. No trouble had been experienced with the concrete flooring breaking due to oscillation or weaving of the car. At the point where passengers enter there is a great deal of wear, and Mr. Gove thought that the entire floor of the pit of the car would have to be renewed probably each year.

Insufficiency of 5-Cent Fare

On Tuesday afternoon President Hamilton first called upon Z. K. Graham, secretary of the Utilities Publication Committee, to explain the plan of issuing the public utilities reports, annotated, as arranged with a firm of law publishers. A paper by E. G. Connette, president International Railway, on "What Can We Give for a Nickel?" was then read by Secretary C. C. Dietz. Mr. Connette's paper is abstracted elsewhere in this issue.

In the discussion on this subject the following points were brought out:

W. H. Collins, general manager Fonda, Johnstown & Gloversville Railroad, said that as the 5-cent fare is prescribed within the confines of cities, legislation will be needed to increase the fare. The commission can be appealed to for relief, but the problem is how to find a remedy for the present difficulty.

C. G. Young, consulting engineer, New York, stated that the present conditions must be met somehow. The passenger wants more for the "jitney," and the company has to pay out more. One solution is to let the cities participate in the net earnings. The cities, being partners, would be interested in increasing these earnings. In the direction of economy rides could be shortened and transfers cut out in some cases. The large amounts spent for taxicab service show that the public is willing to pay for service.

R. L. Rand, vice-president Richmond Light & Railroad Company, described the experience of his company in drafting and pressing a bill exempting it from paving requirements for a period of ten years. There was no opposition, but the bill was side-tracked. Mr. Rand said that the paving requirement is antiquated and outworn.

E. F. Peck of Allen & Peck, Inc., Syracuse, recommended the appointment of a committee to study the subjects discussed in Mr. Connette's paper.

H. W. Blake, ELECTRIC RAILWAY JOURNAL, said that while it will be difficult to increase fares there would probably be less public opposition to doing so because of the precedent of higher steam railroad passenger fares, and the principal thing now was to decide upon the best plan for each locality and work toward that end. There were three ways of raising fares and each had a precedent. They were: (1) Raise the unit fare to 6 cents as in Massachusetts. (2) Retain a 5-cent unit fare for a restricted district and charge additional 2-cent fares for exterior zones. While railway managers may consider this system complicated the experience in Milwaukee had shown that the problems of collection could be satisfactorily solved both as regards the company and the public. (3) Charge for transfers as in Cleveland. For this also there is an operating precedent. While these reforms seem revolutionary and may be difficult to secure, each is not seriously difficult from an operating standpoint.

James E. Hewes, general manager Albany Southern Railroad, described the tax-reducing campaign which his company had been conducting in the suburban territory served by it. Previous experience was with rising assessments, but after two years' effort the taxes have come down from 9 per cent of the income to 5 per cent, and the assessment 25 per cent each year. The company demanded meetings of the assessors one month before the preparation of tax budgets and presented evidence of assessment inequalities.

E. S. Fassett, New York Switch & Crossing Company, New York, thought that the publication of information in recent years should make tax reduction easier. If tax commissioners can be made aware of conditions, then reductions would be made by the franchise tax board.

C. Gordon Reel, consulting engineer, Kingston, N. Y., contended that the companies were often to blame for inequalities in assessments as their reports were not properly prepared.

After the close of the discussion a letter was read from the Brooklyn Rapid Transit Company inviting members to visit the new instruction school and to ride on the new subway cars.

A vote was also taken passing a resolution for the appointment of a committee to report at a later meeting on Mr. Connette's suggestions. President Hamilton announced that he would appoint this committee later.

Messrs. E. S. Fassett, W. H. Collins and E. F. Peck were appointed as the nominating committee.

JITNEY-BUS COMPETITION

At the session on Wednesday morning James E. Hewes, general manager Albany Southern Railroad, presented a paper entitled "Jitney-Bus Competition" which is abstracted on another page. He emphasized the difference between the real jitney bus that consisted of an old automobile driven by its owner and the high-grade, large-capacity motor-bus, saying that the former was not a menace to the electric railway industry but that the latter could be used to good advantage, especially on new routes, to test and to build up the traffic with possible installation of an electric line later.

The discussion was opened by Joseph K. Choate of J. G. White & Company who had had a wholly contrary experience to that outlined by Mr. Hewes. If the motor-bus should become permanent it would eventually have to pay for its use of the highways which had been constructed at an even higher cost than railways. In New Jersey he had established a short bus line to form a physical connection between two separated sections of a trolley road. The traffic conditions were excellent but the line lost 100 per cent in six months and had to be abandoned. The repairs were excessive. Depreciation of all gasoline-driven vehicles also was impossibly high when compared to those on electric railways. As for the buses in London, these were put on years before the electric railways and had never competed with them, as implied by Mr. Hewes. He had investigated motor-bus operation for New York City and had found that any fare less than 10 cents was impossible.

Paul Smith, Westinghouse Electric & Manufacturing Company, then spoke in support of the makers of electric railway equipment, saying that the demand for low weights had arisen and endeavors had been made to meet it long before the advent of the jitney bus.

William H. Collins, Fonda, Johnstown & Gloversville Railroad, outlined his experiences with interurban bus competition, which in one instance consisted of a bus line operating 4 miles for a 5-cent fare in direct competition with the railway. A campaign of education including daily statements published in the local papers had been efficacious in producing refusals to grant franchises to motor-bus lines because there was no real necessity for the new service. Climatic conditions, he said, constituted the strongest argument against the motor-bus in central New York, as buses could not maintain service in heavy snow. However, there might be conditions where the bus could be used satisfactorily for supplementary service.

J. P. Barnes, Buffalo, Lockport & Rochester Railway, considered that publicity had been a major cause of the jitney's success, and that the railways should talk more about the railways in public and less about the jitneys. It was not necessary to have local holders of railway securities in order to hold the public's friendship.

H. W. Blake, ELECTRIC RAILWAY JOURNAL, disagreed with some of Mr. Hewes' figures. He believed that the figures quoted for gasoline consumption of motor-buses was low, but even on the basis mentioned in the paper the cost of power would be less for an electric car than for the motor-bus when figured on the seat-mile. The same basis should also be used in estimating the investment. He thought that the figure of 10 per cent for depreciation on the electric railway was much too high.

but a sixty-passenger car would have nearly three times the number of seats of a twenty-two passenger bus and more than three times the carrying capacity. Hence the annual depreciation, even on the basis given in the paper, would be one-third higher for the bus than for the car if the relative carrying capacities of the two vehicles were taken into consideration. The same ratio of comparison ought to be applied also to the figures on operating cost of 21.8 cents per mile quoted for the twenty-two-passenger bus. Two such buses would be equal in seating capacity to a single city forty-four-passenger car and the cost of operating two such buses, or 43.6 cents, ought to be more than ample to operate one such car to advantage. He also believed that the public would require, for its own protection, regulations for motor-buses similar to those required of other common carriers.

In answer, Mr. Hewes admitted the importance of considering the relative size of the average bus and the average railway car in making cost comparisons but cited the case of a successful interurban bus line at Pittsfield, Mass., which charged 2 cents per mile and was reported to have cleared 100 per cent in six months. The speed, however, was only 12 m.p.h.

W. B. Rockwell, Eastern Pennsylvania Railways, Pottsville, Pa., spoke of the real economy of electric power notwithstanding the large investment required, on account of the facility of distribution. The jitney from every moral aspect was thoroughly bad. In Reading the local civic society had voluntarily taken up the matter of suppressing the business. It would soon be considered a public disgrace to ride in a jitney bus.

W. O. Wood, New York & Queens County Railway, said that the railways ought to try to put themselves on the same taxation basis as the jitney and not try to put the jitneys on the railway basis.

Protection of Highway Crossings

William H. Hyland, claim agent Fonda, Johnstown & Gloversville Railroad, then read a paper on highway crossings which is abstracted on another page in this issue.

In the discussion J. P. Barnes read some remarks prepared by C. R. Barnes, who in his official connection with the Public Service Commission of New York, Second District, made a special point of the fact that automobile drivers paid more attention to crossing signs put up by automobile organizations than to those put up by railway companies. He asked therefore for the appointment of a committee to co-operate with the automobile clubs of the State and with the Public Service Commission in regard to crossing protection. In response to this it was decided that the association would gladly confer on the matter whenever the Public Service Commission would call for such a meeting. Mr. Barnes also asked for co-operation in regard to existing discrepancies in the railway rules on carrying explosives, and this matter was referred to the executive committee.

Owing to the lateness of the hour the question box was omitted and the association proceeded to the election of officers, the following being unanimously elected:

President—John J. Dempsey, Brooklyn, N. Y.

First vice-president—James P. Barnes, Rochester, N. Y.

Second vice-president—Wilbur C. Fisk, New York, N. Y.

Secretary-treasurer—W. S. Stanton, Schenectady, N. Y.

Executive committee members were elected as follows: J. S. Doyle, New York, N. Y.; C. F. Hewitt, Albany, N. Y.; James E. Hewes, Albany, N. Y., and E. J. Dickson, Buffalo, N. Y.

President Dempsey was then escorted to the chair, responding with a few well-chosen words. After resolutions of thanks to the retiring president and secretary-treasurer the meeting adjourned.

The Social Features

The social features included automobile trips for the ladies, an auction bridge tournament on Tuesday afternoon, dancing after the banquet Tuesday evening, and a baseball game following the Tuesday afternoon session between the "managers" and the "peddlers." In this baseball game the managers won with a score of 15 to 10, if the official score is to be believed. The highest batting average was made by C. F. Banghart, general manager Binghamton Railway, who, in addition to making many base hits, scored a run every time that he came to the plate, which was five times during the five innings. In consequence of this achievement, he received a statue of Charlie Chaplin, which was the prize offered for the largest number of runs made by any individual player.

The Banquet

The banquet held on Tuesday evening was remarkable from the fact that at the speakers' table there sat four members of the New York State Public Service Commission, namely, Judge Edward E. McCall, chairman, George V. S. Williams and Robert C. Wood of the first district commission and William Temple Emmet of the second district commission. Of these, addresses were delivered by Messrs. McCall and Emmet. The banquet was attended by upwards of 200 persons and was marked by evidences of a co-operative spirit in the matter of public utility regulation. President James F. Hamilton presided as toastmaster and was very happy in his introduction of the speakers.

Commissioner Emmet discussed the regulatory situation in New York State, frankly admitting its shortcomings but expressing an expectation of fuller understanding between the utilities and the commissions. He said that regulation is not such a sore subject as it once was. While the regulatory program outlined by Governor Hughes was viewed with some apprehension it would be unthinkable now to go back to the old order. The apprehension was based upon the fear of the intrusion of politics into a field where expert knowledge was needed. There are still annoying features in regulation, but sensible men do not let these bother them. The "black horse cavalry" no longer disturbs the sleep of public utility men. Old-fashioned strike legislation has, through regulation, become a thing of the past. While regulation is not perfect its imperfections are being remedied, and the public utility men of the State and the commissioners are good friends, and friends of the principle of governmental regulation. The principal source of irritation has been due to the impossibility of staking out definitely the line of demarcation between regulation and government ownership and operation. For example, in the matter of supervision of service of street railways the commissions have sweeping powers, going into many matters of operating detail. Under the law they must give hearings on matters of this kind. It is a question whether this feature of the work should not be considered a part of the principle of government operation rather than regulation. A large section of the public expects the commissions to look after all operating details. Mr. Emmet raised the question as to whether this is a proper function for a public service commission.

In regard to the friction which has occurred in matters of regulation, all parties concerned are to blame. The sensible course for public utility men to take is

that which has been taken by the New York Electric Railway Association in the line of co-operation. Such co-operation is necessary in the solution of the problems involved. Public utility men should accept the principle of regulation, which is still in the experimental stage. While it is in this stage, inconsistencies must be overlooked. When the public comes to realize the attitude of public utility men toward regulation, many of the present problems will be solved. The public utility industry needs business men who are also statesmen. Mr. Emmet expressed the belief that regulation has seen its worst day and that a period of understanding is here.

Mr. Emmet was followed by Nathan C. Kingsbury, vice-president American Telephone & Telegraph Company, whose central thought was the need for co-operation among public utilities. He called attention to the fact that one-fifth of the wealth of the country is invested in public utilities which form a stable business necessary for the people. The margin of profit in this business is small and the problem of operating at a profit is a difficult one. Favorable conditions are necessary. A public utility corporation which is not now making money but which is serving the public faithfully can look forward with hope. On the contrary, one which is making money but which is not giving good service is doomed to failure. The men who started utilities were far-sighted, even considered visionary by some. After launching the utilities many of them stepped out, leaving difficult problems for their successors to solve. The day of these promoters has now passed but they did a good work. The speculative methods necessary in the early days are not needed now. All that is expected is a fair return. In the early days investors thought that they were investing in private business when they put their money into public utilities. It is now realized that this is not the case.

In order to improve conditions the public service corporations should get together on a co-operative basis. They have many interests in common and the public does not discriminate among them. In a community where one utility is successful others are apt to be so also, whereas the reverse of this is at the same time true. In the past public service corporations have not known each other. Now they are getting together. An example of this is seen in the co-operation which has been brought about in the use of transmission pole lines. Utilities could get together on the matter of valuation and in promoting an interest in public service commission decisions, many of which reach several utilities. The managements of the utilities must work to make the work of the commissions successful. Failure of the valuation commission work of the Interstate Commerce Commission, for example, would spell disaster to some corporations.

Mr. Kingsbury emphasized the value of the publicity clause of the code of principles of the American Association. The utilities must control public opinion through publicity. An example of large appreciation of this fact is shown by the activity of the warring governments of Europe in publishing the facts regarding the beginnings of the war. All that the war can do is to force the countries into a state of mind wherein they will give and take. When this time comes public opinion will be all powerful. Secret methods cannot be successful in public utility matters. New capital is constantly needed and if a company is not making money it cannot get capital. This fact tends to secrecy as to financial conditions, but such secrecy is not warranted. Much adverse legislation might have been prevented if the railways had practised publicity earlier.

Regulation can be overdone, and the commissions should realize the conditions under which public utility operations must be conducted. For example, the European war has made inroads on capital, the warring countries paying high rates of interest. This will make it more difficult to get capital for utilities and also for municipal and other public improvements. This is indicated by the fact that at the New York bond sale this week the city has to pay nearly 4½ per cent for its money. While the utilities do not ask for a high rate of return, they do ask for stability and such a rate as will attract capital.

Referring again to the subject of publicity Mr. Kingsbury pointed out that the railways must have a desire to serve, and that if there is some policy which cannot be made public that policy should be abandoned. Public utility securities are widely distributed and this fact should be made known. Further, the utilities are not ashamed of the men who promoted, developed and now manage them. The public service corporations have had much to do with the beneficent development of this country. They have added great wealth to the country and have fostered a homogeneous development. They make for prosperity and peace.

Judge McCall began his address by emphasizing the magnitude of the task of operating the properties in the metropolitan district. This task he said is unprecedented. New York City is spending $366,000,000 on rapid transit because of a realization of the tremendous growth in the demand for service. The service is not perfect, but the public insists that it should be so. Judge McCall agreed with Commissioner Emmet in regard to the separation of regulation and supervision of operation, expressing his belief that the former is the function of the commissions. He has stood for conservatism and the conservation of property rights, and has not and will not allow public clamor to trespass upon these. He had asked himself and his visitors many times why public utilities should not give good service when they have every cause to do so. He stated that much of the hostility to public service corporations does not come from the public but from interested persons. In closing he invited the association to co-operate with the commission in team work in bringing about a better understanding of the problems of regulation.

Before calling upon Charles C. Peirce, vice-president of the Manufacturers' Association, the last speaker on the program, Toastmaster Hamilton read telegrams from C. Loomis Allen and J. H. Pardee, expressing regret that they could not be present and sending good wishes for the meeting.

Mr. Peirce's plea was for appreciation of the supply men. The manufacturer occupies no small position in the public utility business. He has worked shoulder to shoulder with the pioneers in building it up. This is evident from the importance of the work done by such men as Sprague, Edison, Westinghouse and other great inventors. He also said a good word for technical journalism and the work that the ELECTRIC RAILWAY JOURNAL has done in furthering the electric railway cause. He said that the name of James H. McGraw will stand with that of other pioneers for the work that he has accomplished in developing his side of the industry. As a further illustration of the identity of the manufacturer with the electric railway, he said that while the manufacturer has worked with the railway he has also suffered with it.

After a rising vote of thanks to the distinguished speakers of the evening the banquet gathering broke up about midnight and adjourned to the dancing floor of the hotel.

WHAT CAN WE GIVE FOR A NICKEL?

With this question as the point of departure, E. G. Connette, president International Railway, suggested several of the problems involved in the furnishing of urban transportation at the 5-cent rate. The nickel was adopted as a convenient unit of exchange in carrying passengers, the distances in the beginning being very short and no transfers being issued. In the progress of time lines were extended and transfers were issued so that the payment of a 5-cent piece entitled a passenger to ride from city line to city line, in many instances from 5 to 20 miles.

"As the necessities arose for the extension of lines and franchises were sought by companies, the public authorities have been from time to time imposing additional conditions. One that is now very burdensome arose out of the conditions existing during horse-car times because the horses, traveling between the rails, wore out the roadway. The reason for this requirement has long since passed, but the burden of the expense remains. The cost of paving the so-called 'railroad strip' is represented in the 5-cent fare, while the abutting property owner receives the benefit besides an appreciation of the value of the property by reason of the street railway service. Patrons of the street railway should not be required to contribute even indirectly toward charges of this kind."

Mr. Connette also explained how the payment of percentages of gross receipts and franchise taxes, the original continuing expense due to change from horse cars to electrical propulsion, the cost of eliminating grade crossings, the advance in the costs of labor and materials; the carrying of firemen and policemen free in many communities, etc., have added to the burdens of the street railway until it now faces a crisis.

"Public service companies are now face to face with the necessity for considering seriously the question resulting from the foregoing conditions and discovering, if possible, some way in which they can either increase their return or decrease their expenditures. The problem can be approached from two points of view: (1) Should and can the unit of fare be increased? (2) Can the expenses and burdens of transportation companies be lightened so that they may continue to carry passengers for the same unit of fare and still earn a reasonable return upon the capital invested? I think it will be conceded by all that the last suggestion, if practicable, would be the most desirable.

"It seems to me that the traveling public and the company are entitled to have the rights of the parties readjusted on a more equitable basis. If the companies were permitted to receive a reasonable return upon the capital invested and then have everything over and above that expended for real transportation service for the benefit of the traveling public, eliminating and removing from the companies the burdens of tax which they now bear, which go toward purposes other than transportation, it might still be possible to continue to charge not more than 5 cents and at the same time pay a reasonable return upon the capital invested. The other alternative is to raise the unit of fare from time to time to cover the increasing expenses.

"The time has arrived to center attention on this question and evolve some plan by which relief can be secured. Under the public service commission's law as it now stands the commission has the power to regulate rates and can do much to relieve the situation if it is deemed wise to exercise that authority. The efforts of the public service companies should first be employed either to procure legislation directly relieving our properties of other burdens and costs not actually involved in transportation problems or, as an alternative, endeavor to have the powers of the commission enlarged so that it may relieve the companies of these burdens in every proper case. In any event we should endeavor to make the commissioners constitutional officers so that they may fearlessly perform their duty."

JITNEY BUS COMPETITION

On the subject of the jitney bus, James E. Hewes, general manager Albany Southern Railroad, said substantially as follows:

I take the radical position that the gasoline-driven vehicle has come to stay, and that its great potentialities can be, to a certain extent, used for our own benefits. I also take the radical position that, if this new form of transportation has come to stay, we must make use of it or else compel the electrical companies, the car builders and the truck builders to give us an electrical vehicle that will compete on equal terms with this new form of competition.

One of the best types of auto-buses with which I am acquainted is a convertible twenty-two-seat, 5-ton car (loaded), having a solid tire and a pneumatic tire on each wheel. The engine is four-cylinder, 30-hp. capacity. The weight of the car is 10,000 lb., or 455 lb. of car weight per seated passenger. A first-class interurban car, seating sixty passengers, weighs 60,000 lb., or 1000 lb. per passenger.

A horsepower can be delivered to the wheel of this gasoline car, with gasoline at 15 cents per gallon, at less cost than can be done by the average trolley company that makes electric current in a power house situated, say, approximately 20 miles from the trolley car, with coal at $3.25 per ton delivered to the boilers. A first-class auto-bus can do a car-mile at a power cost of 1½ cents. The type of auto-bus I speak of makes 10 miles on a gallon of gasoline, and the gasoline costs approximately 15 cents per gallon. Therefore, our competitor can operate a mile, can produce a horsepower where he wants it, can operate a ton-mile or a seat-mile at less cost than we can, and can carry a passenger in his auto-bus with one-half the weight that we can.

Let us now consider the item of investment and make a comparison between our competitor and ourselves, taking the item of investment as one unit, and comparing a trolley car with an auto-bus.

We pay $9,000 for a 30-ton interurban car, with a seating capacity of sixty, equipped with four 75-hp. motors, type "M" control air brakes, lighting circuits, two trolleys, registers, etc.

A first-class auto-bus of twenty-two seating capacity costs $4,500 complete, or just half the cost of our trolley car of sixty seating capacity, but the seat cost of the jitney is $205, whereas the seat cost of the interurban car is $150. The $205 per seat cost of the jitney is all the investment that our competitor has, but our $150 seat cost is only the smallest portion of our real net seat cost, because, after we buy our trolley car, we must build power houses, lay tracks, erect poles, pave streets, bond our tracks, equip trolley lines, construct and equip transformer stations and substations, until we have a total investment of approximately the following:

Power house cost per car	$3,000
Substation cost per car	1,200
Trolley line cost per car	2,000
Track cost per car	20,000
Cost per car	9,000
Total cost of trolley car before it can run	$35,200

I submit these figures only as a basis for comparison of first cost, and primarily to draw attention to the fact that our first cost, reduced to a seat basis, is vastly

greater than that of the first-class auto-bus. If the depreciation of the bus were at the rate of 33 per cent and the depreciation of a complete trolley system were but 10 per cent per annum, including obsolescence, the bus would, nevertheless, show a total depreciation less than ours, because 33 per cent of $4,500 is $1,485, whereas 10 per cent of $35,000 is $3,500.

Now, the bus has been made possible only by reason of the improved roads, built at the expense of the state and county. It has also been made primarily possible by the great economic development of the gasoline motor and the remarkable development of the automobile chassis. And we are confronted with the fact to-day that the average automobile is a higher development of mechanical principles than the trolley car. The tendency of our electrical engineers is to make our equipments of greater capacity and greater weight. The tendency of the automobile manufacturers is to reduce the amount of horsepower and lighten the weight of their automobiles. We must look to the electrical engineers to help us solve our problem. Our car builders must create a revolution in the car if they wish to stay in the game. Otherwise the electrical engineers and the car builders will be in the same position as we will be, namely, looking for other jobs.

I believe, as I have stated before, that gasoline transportation has come to stay, and that we should make use of it at first, or experimentally, as an auxiliary or aid in the development of our traffic. Where we seriously consider extensions to our lines, we can well use the gasoline vehicle, not paralleling our traffic, but beginning at the ends of our lines and transferring passengers to the extension territory, until the traffic becomes sufficiently reliable and congested to warrant the installation of tracks and trolley.

Other uses for the auto-bus by trolley companies would be in locations where there is considerable distance between our parallel tracks in congested districts that invite the jitney. In such districts it is well to consider the possibilities of the auto-bus, because in such localities the jitneys take away a permanent form of traffic.

By using the auto-bus to the extent cited, we will immediately win back the nickels we have lost and will do more than anything else to discourage jitney-bus competition and to prevent capital entering this field, because the jitney thrives best in a field originating in a congested district and paralleling our lines, and by carrying passengers to points beyond our track limits.

Few of our passengers would take a jitney-bus to points beyond our lines if they could ride in comfortable cars to our track limits and then be carried to points beyond in a comfortable, well-equipped auto-bus operating on a regular schedule. One such bus, by making frequent short trips, would replace many buses making a long trip.

Generally speaking, an electric traction company, if it used an auto-bus as an auxiliary, would discourage competition on any extensive scale, and would prevent organized incorporated capital from entering the field, which is the most dangerous feature of this form of competition. Most of the jitney competition is now in the hands of "shoe-string" capitalists, but when organized capital enters the field we will have to fear the worst. If, however, we make use of the gasoline auto-bus as an auxiliary, organized capital will be slow to enter the jitney-bus field.

We have, indeed, a serious problem to consider. There never was a time in our history when we were confonted with a problem that required us to make greater efforts to accomplish economies, and to combine our great capital to prevent further inroads into the field. We must organize our capital to prevent organized capital from entering the field of competition; we must combine our legal talent to have enacted such laws as will place our competitors on an equal basis with us; and we must enlist the combined talent of the electrical engineers and the car builders to give us a vehicle that will place us on an even footing with the jitney-bus competition.

I will say, in conclusion, that the total cost, including fixed charges, for operating an auto-bus-mile for a bus having twenty-two seats, based upon an annual bus-mileage of 30,000, is 21.8 cents per mile. There are few electric roads that can equal this. For over ten years more passengers have been carried by buses in London than have been carried by trolley lines. The service is just as good and as regular. When London got the bus habit, and the buses became popular, the capitalists owning surface trolley lines promptly unloaded them on the city and obtained exclusive franchises to operate the bus lines.

THE CENTER-ENTRANCE CAR FOR CITY AND SUBURBAN SERVICE

An account of the center-entrance car for city and suburban service was given by W. G. Gove, superintendent of equipment Transit Development Company, Brooklyn, N. Y., but as this car has been fully described in these pages, the technical features of this paper will not be furnished here. Mr. Gove concluded his remarks as follows:

One hundred and one cars of the center-entrance type have now been in service on the Brooklyn Rapid Transit system for over two years, and the results obtained have been very satisfactory. The principal advantage of this car is the reduction in boarding and alighting accidents, due to the doors being closed at all times when the car is in motion.

The following table gives a comparison of boarding and alighting accidents per 1000 car-miles for three different types of cars, operated on the same lines during the last calendar year:

Type of Car	Accidents per 1000 Car-Miles
Closed, semi-convertible and convertible	0.11
Open	0.26
Center-entrance	0.03

Another operating advantage of this car is its ability to carry an increased number of passengers with a decreased number of cars. This is accomplished by the shorter stops required, as passengers are entering and leaving at the same time, and by the increased seating capacity. On one line it was possible to make a reduction of seven cars per day on the schedule, or 190 trips and 24,142 ton-miles, with an increase in seat-miles of 45,022.

When the cars were first placed in service it was thought there might be some slight delay at terminals in loading and unloading passengers and in collecting fares as passengers entered. This has not been the case. At the Park Row terminal of the Brooklyn Bridge the passengers are allowed to board through both entrances and exits on one side of car, after all passengers have alighted from the opposite side. Fares are collected as the car is crossing the bridge.

At Borough Hall and Atlantic Avenue, the only two heavily congested points in Brooklyn, passengers are prevented from entering by way of the exits by two inspectors, one located at each exit, who also assist passengers to board the car. Fares are collected as passengers enter, but transfers are not issued until after the car starts. By this arrangement no delays are occasioned and schedules are easily maintained.

The light weight per passenger-seat is also an item not to be overlooked. This is saving money, not only in power consumption, but in wear and tear on equipment and roadbed.

THE PROTECTION OF INTERURBAN RAILWAY HIGHWAY CROSSINGS

In introducing this subject for discussion William H. Hyland, claim agent Fonda, Johnstown & Gloversville Railroad, first outlined the relation of the growth in automobile traffic during seventeen years, in which period the number operating in New York State has increased from forty-five to 150,000. At the same time the possible speed has increased from 25 m.p.h. to very high values. He stated further in substance as follows:

The qualifications necessary for operating an automobile in the State of New York do not include that of normal vision. Any person who can purchase an automobile, or any member of his or her family, even though partly deaf and with impaired vision, is allowed to operate automobiles upon the highway. There is a striking contrast between the requirements for driving an automobile and an interurban car. The motorman of today must not only be sound of body, but he must have perfect vision and hearing, tested by a competent physician every two years and after any severe illness. Much responsibility naturally rests upon the motorman, and for this reason the greatest care is exercised in selecting him. It should be quite comforting to nervous people to know that out of every 100 men who enter the train service only twenty become motormen, and only five of this number become motormen of interurban cars. The motorman is thoroughly trained to meet every emergency, and his efficiency is as carefully looked after as that of anything upon the railroad.

There are differences of brain power, taste, aptitude, physical power, mental strength, moral force and vision. With these inherent differences there must be different results. These great differences among men are the causes of many accidents at highway grade crossings. Whichever way we turn we find signs safeguarding the grade crossings. It is, however, impossible to get away from the personal equation. Frequently an eye fails to locate and measure correctly the position and speed of an approaching car; an ear fails to hear the warning bell or whistle; a hand fails to stop the horse or slow down the automobile, a mind goes "wool gathering" for a moment, and here we have, I believe, the cause of 95 per cent of our grade-crossing accidents.

With the advent of the automobile, railway companies caused signs to be erected facing the highway at points well back from crossings. These signs urged drivers of automobiles to slow down and look out for the cars. Crossing signs were illuminated so that they who ran, even in the dark, could read. Wherever possible, trees and buildings which in any interfered with a clear view of the tracks from the highway were purchased by railroad companies and removed. Of course, all highway grade crossings are dangerous places, but some crossings are safe as compared with other crossings. At the more dangerous crossings—that is, where people, on the highway, by looking cannot see and by listening cannot hear approaching cars—cars are stopped before crossing the highway. The whistle is sounded and the bell is rung. In fact, everything that railroad companies can do to safeguard the lives of people on grade crossings is done, but all the precautions in the world will not save the lives of those who drive vehicles recklessly over railroad crossings.

Acquiring definite information is, of course, the chief reward of all systematic reading and thinking, and in these days, when knowledge means much, this is important. It is especially important when the knowledge gained is on a practical subject, like the one in question. However, I really believe that if the managers of railroad companies should withdraw their attention from all other matters and center it upon the subject of the protection of highway grade crossings, they could learn nothing that they do not already know. The need of the railroad manager is not more information from the claim department upon this subject, but, on the contrary, it is money with which to eliminate these dangerous places. To obtain the money with which to do this most important work will depend largely, I believe, upon the attitude of the public toward railroad corporations.

The railroad is the partner of the business man. Partnership implies working together for a common end, and when the partners shall have viewed this subject from the same angle, railroad managers will have money with which to eliminate these dangerous crossings, and not before. Railroad companies are doing everything in their power to safeguard crossings, through men and machinery and by the posting of large signs, warning automobilists to look before crossing the track. They are doing their part and should at least receive due credit for their efforts and improvements.

A Remedy for Dusting Concrete Floors

At a recent meeting of the American Concrete Institute the question of eliminating the dusting of concrete floors was brought up for discussion. This problem is of particular interest to electric railways because of the generally adopted practice of using concrete floors in shops, carhouses and power stations. In this discussion it was brought out that more than thirty different methods had been attempted to eliminate this undesirable characteristic, but only two or three had been found at all satisfactory. Silicate of soda was included among those proprietary remedies which had given fair results. A better remedy, however, was discovered twelve years ago when the dust on the floor of a generating station damaged the bearings of some of the machines. A coating of linseed oil was applied to eliminate the cause of the trouble. In this case raw oil was used and the excess wiped off with waste, but later developments have demonstrated that boiled oil was better than raw oil, since it dried more quickly. One objection to the oil was that it produced a mottled appearance due to unequal absorption, but this undesirable feature has been overcome by the inclusion of lamp black, which gave the floors so treated a uniform slate color.

It was generally agreed that dusting of concrete floors was the result of using a mixture too rich in cement, or sand of too fine grain. Both of these causes are readily obviated by the use of a coarser and harder sand, or even crushed granite screenings in the wearing surface, and by a reduction in the quantity of cement. The more recent introduction, however, of fine iron and steel filings into the cement used in the wearing surfaces of floors is meant to attain the same end, and logically there is no reason why it should not. Another precaution employed to improve the wearing quality of concrete floors is to use only enough water to make the surface trowel without undue effort. It should also be allowed to cure for at least ten days, during which time it should be sprinkled frequently to complete the hydration of the cement.

The Cleveland, Southwestern & Columbus Railway, which adopted Eastern time shortly after Cleveland made the change, has returned to the use of Central standard time. None of the other towns and cities on its line used Eastern time.

COMMUNICATIONS

The New York Jitney Law

INTERNATIONAL RAILWAY COMPANY,
BUFFALO, N. Y., June 28, 1915.

To the Editors:

I notice a statement in the table on page 1224 in the ELECTRICAL RAILWAY JOURNAL for June 26, that the New York law regarding jitneys provides "that no jitney shall operate until the owner has procured the consent of the local authorities and has executed a bond in an amount fixed by said local authorities."

The law goes further than this. It also provides that they cannot operate until they have secured a certificate of convenience and necessity from the Public Service Commission, and in order to get this it will be necessary for any jitney operator to show by testimony under oath at a regular hearing before the Public Service Commission that the service is a public necessity and convenience.

E. G. CONNETTE, President.

Rating of Railway Substation Machinery

NEW YORK, N. Y., June 30, 1915.

To the Editors:

Your editorials on "Continuous vs. Normal Rating of Railway Substation Machinery," with their advocacy of continuous instead of nominal rating, suggest the desirability of introducing another factor into the rating of duty-cycle machines, or those whose cycle of load repeats itself with more or less regularity.

The heat generated in an electrical machine is primarily expended in raising its temperature. The greater the heat capacity of the machine, the more heat will be required to raise its temperature a given number of degrees, or, to put it another way, the greater the heat capacity, the less will be the temperature rise with a given expenditure of heat. As soon as the temperature begins to rise, however, the heat no longer confines itself to raising the temperature of the machine, as part of it is dissipated in the air by radiation and convection. At first the heat dissipation will be unimportant compared to the heat absorption, but as the temperature rises, it assumes increasing importance until, at a certain temperature, the rate of dissipation equals that of absorption. This is the temperature at which the machine will run continuously with the energy losses assumed. The greater the heat-dissipating ability of the machine, the less the temperature rise in continuous operation or, to put it another way, the greater the dissipation the greater may be the energy losses for a given temperature rise. It is therefore obvious that the fundamental characteristics of a machine, from the point of view of heating, are its thermal capacity and its thermal dissipation quality.

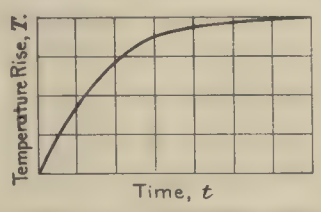
The continuous rating of a machine, being a measure of its thermal dissipation, is a perfectly satisfactory measure of its capabilities under practically constant load conditions, such as occur in lighting stations. In railway substations, however, the fluctuating character of the load renders the continuous rating less complete as a measure of capability, and necessitates an additional rating which will measure the capability of the machine to absorb the heat generated by heavy loads of short duration. The rating which accomplishes this is the thermal capacity.

Unfortunately, the thermal capacity has not been standardized as a rating. True, it is mentioned in an appendix to the 1914 Standardization Rules (Section 447), but only in connection with railway motors.

The nominal rating is a rather abortive attempt to combine the thermal dissipation and thermal capacity in one figure. Such an attempt is like trying to define a parallelogram by giving its area only, without reference to its shape. In either case the combination of the two quantities into one makes the rating fit innumerable cases. For example, a machine of high thermal capacity and low thermal dissipation may have the same nominal rating as a machine of low thermal capacity and high thermal dissipation. The two machines will be of radically different design, suited to entirely different services, but will have the same rating.

The thermal capacity depends upon the amount, disposition and specific heat of the materials of which the machine is composed. The thermal dissipation depends upon the ventilation, the areas of heat-dissipating surfaces and the specific radiation of these surfaces. How can these two distinct properties of a machine be put into the rating?

An answer to this question is suggested by a consideration of the curve of temperature rise of a machine operating at any constant load. The form of such a curve is shown by the accompanying sketch, from which it will be observed that during the early stages of the run, the temperature rise follows an almost straight line law due to the fact that practically all the heat generated is used in raising the temperature of the machine. Later the curve bends over due to the increase of heat dissipation as a machine becomes hot. The thermal capacity of the machine is proportioned to the slope of the straight line part of the heating curve with respect to the vertical axis. Thus if the mean temperature rise in t hours is T degrees with a constant load, giving a loss of P kilowatts, the thermal capacity will be Pt/T kilowatt-hours per degree rise. The ratio t/T which gives the slope of the curve with respect to the vertical axis, may be determined by stopping the heat run after, say, fifteen minutes and taking temperature readings. Assuming that this plan is practicable, we would be equipped with a measure of the thermal capacity of the machine which may then be used to determine its capability for carrying overloads for short periods. It is unnecessary to enter into the details of how this is done, but let it suffice to say that if we are provided with a load diagram and the thermal characteristics of the machine, it is an easy matter to plot a curve of temperature rise, no matter how complicated the diagram.



RATE OF TEMPERATURE RISE IN ELECTRICAL MACHINERY

The practicability of determining the thermal capacity as here outlined is, perhaps, open to doubt, due to the uncertainty of the temperature rise, which will probably be a small quantity and due to the uneven distribution of heat in the machine. There is, however, sufficient promise in the plan to warrant careful investigation. The standards committee of the A. I. E. E. has given the matter considerable thought, but received little or no encouragement from the railway men. I wish to commend the subject to the attention of electric railway engineers in the hope that a demand will arise for the rating of railway machinery in accordance with its thermal characteristics. The adoption of the continuous rating will supply one of the two necessary ratings. Is it not time for us to talk for the other?

WILLIAM L. DEL MAR.

The Chicago (Ill.) Tunnel Company has issued an elaborate folder entitled "Lifting the Lid in the Loop" for the purpose of acquainting the public with the property and the benefits derived by shippers and the city at large through the tunnel.

ANNUAL CONVENTION SAN FRANCISCO OCTOBER 4 to 8, 1915

American Association News

ANNUAL CONVENTION SAN FRANCISCO OCTOBER 4 TO 8, 1915

Under the Auspices of the A. E. R. A. and N. E. L. A. a Meeting Is Held in Manila at Which Public and Private Ownership of Utilities Is Discussed—Committee and Section Activity

COMMITTEE ON UNIFORM DEFINITIONS

The committee to develop uniform definitions of the American Electric Railway Transportation & Traffic Association met at the headquarters in New York on June 25. The following were present: H. C. Donecker, chairman; William C. Greenough and Frederic Nicholas. The committee went over in detail the definitions reported by the 1913 committee on the same subject and definitions contained in the 1911 report of the committee on construction of schedules and time-tables, and also considered suggested changes and additions.

The definitions, which have been reported to the association but not yet adopted formally, will be considered carefully by the members of the committee in comparison with definitions contained in the reports of the committees on rules and construction of schedules and time-tables and the joint committee of the Engineering and the Transportation & Traffic Associations on block signals for electric railways. Several of the terms which have been defined tentatively are of equal interest to allied associations and in order that the definitions may be satisfactory to each department of operation concerned, the committee will ask for the appointment of joint committees to act on these matters. Several additional terms were suggested for definition. The committee will hold another meeting on July 13.

GOVERNMENT OWNERSHIP DISCUSSED IN MANILA

As announced in the issue of the ELECTRIC RAILWAY JOURNAL for June 26, page 1211, the May meeting of the joint Manila Electric Railroad & Light Company section of the American Electric Railway Association and the National Electric Light Association was devoted to the subject of the relative advantages and disadvantages of private and government-owned public utilities. A paper with this title was presented by W. R. McGeachin, manager of the railway department of the company.

Mr. McGeachin's paper was based upon quotations from a number of important articles and reports. He first stated that while theoretically government ownership of all public utilities is the ideal condition, the principal argument against the public ownership of certain utilities is that the basic political and social conditions under which these utilities have existed and do exist are not ideal. This is not a theoretical reason but, being based on practical results and existing conditions, furnishes an all-powerful and irrefutable argument. Mr. McGeachin quoted from the National Civic Federation report giving the results of the investigation conducted by that body during 1905 and 1906, from the report of W. D. Mahon and L. D. Bland to the Amalgamated Association of Street & Electric Railway Employees of America in 1914, from an address on European public-utility conditions by W. J. Clark of the General Electric Company, from the proceedings of the conference of mayors held in Philadelphia last year and from the code of principles of the American Electric Railway Association. Abstracts of these various statements can be found in the file of the ELECTRIC RAILWAY JOURNAL.

In the discussion of Mr. McGeachin's paper L. L. Vincent, superintendent of electric testing of the company, expressed the belief that in America the people are willing to give private owners of public utilities a chance to earn a reasonable return on their investment, provided satisfactory service is furnished and that the code of principles of the association, when applied, will have the effect of educating the people generally and preventing hostile agitation. He considered the American Telephone & Telegraph Company's experience with publicity to be typical of the effects of frank publicity.

Clifford H. French, auditor for the Philippine Islands, referred to the fact that the incentive of profit is absent in public operation of utilities. Recent inquiries in China showed him that the operation of the railways by the government was more or less of a failure because the government could not pay suitable salaries to keep employees in a contented state of mind. He believed that no present government is organized on a basis of efficiency as compared with great representative corporations.

M. F. Loewenstein, president Pacific Commercial Company, referred to the difference between a Canadian Pacific train and an Inter-Colonial train as they stood side by side in the station at Montreal. As a result of the comparison he did not favor government ownership of railroads as much as he had done previously. He instanced the government ownership and operation of steam railroads in Australia where on one trip he was obliged to ride on three different trains, as one road had a narrow gage, one a standard gage and one a broad gage. He considered that the public ownership and operation of street railways in Sydney was satisfactory and noted that a long ride was given for a penny. Comparatively unsatisfactory conditions in Melbourne were explained by the fact that the company's franchise was about to expire and for that reason needed improvements were not attempted.

H. M. Pitt, president of the Manila Merchants' Association, stated that government at best is a cumbersome affair, and if it is possible to relieve it in any way of its multifarious duties it is good for the government and the public to do so. He stated that the government operated the ice plant in Manila under compulsion as the plant was built by the military government and was turned over to the civil government. For years the ice plant maintained a price for ice that was out of all reason, and it never reduced the price until the private companies did so after getting into a fight among themselves. Governmental ownership and operation of the ice plant in Manila is hardly a criterion of the success of such ownership of utilities.

The political aspect of the question was pointed out by M. D. Royer, traffic manager of the Manila Railroad Company, a steam railroad. He referred to the differences in conditions with regard to government ownership in European countries and the United States, and especially with regard to the possibilities of political control under government ownership. Conditions in the United States at this time do not warrant such ownership.

The experience of Japan in government ownership was outlined by Y. Mikami, manager of the Mitsui Bussan Kaisha. He said that the cumbersomeness of governments had been proved, and therefore the less the governments do the better for the people. In Japan it was necessary in many cases for the government to

inaugurate public utilities in order to have them, and principally for this reason the people of Japan advocated such ownership, but this does not prove anything. It is not surprising that in the United States, where the people are more practical than any other people in the world, public utilities are generally privately owned.

George H. Fairchild of Welch, Fairchild & Company, sugar planters, in referring to his experiences on government-owned railroads in Europe said that the service given by them was inferior to that furnished by the American railroads.

In closing the discussion C. N. Duffy, vice-president of the company, said that the people who advocate government ownership and operation are usually non-taxpayers. Speaking as a taxpayer he felt that whenever a government can or does operate public utilities as efficiently and as economically as a private company can and does, then and not until then is it time to take up the question for consideration. The men engaged in the public-utility business are performing a public service and are doing presumably what the government could not, or would not, undertake to do. He instanced the local electric railway, light and power system. The real reason for the success of privately-owned public utilities, and for the failure of government-owned public utilities, lies in the fact that in the latter there is no hope of individual financial reward, the personality of the man is lost sight of, and the individual's right to assume authority and discharge responsibility is hopelessly entangled in masses of red tape.

Referring to the advocacy of government ownership and operation of telephone and telegraph lines by the Postmaster-General of the United States, he called attention to the fact that the Postmaster-General also advocated the operation of rural free delivery postal service privately, as it had cost the government during the last fiscal year $56,000,000 whereas the service could have been performed privately for $20,000,000.

Mr. Duffy did not favor limited franchises for privately-owned utilities but preferred the indeterminate permit. He said that the franchise granted by the Philippine Legislature, recommended by the Board of Public Utility Commissioners for the Philippine Islands, for a hydroelectric plant on the Caliraya River was for a term of ninety-nine years. The government reserved the rights under certain conditions to purchase the property within twenty years after the plant began operation provided that the actual cost should be paid, plus 10 per cent, and plus such additional amounts as would equal the return in cash equivalent to an average of not less than 10 per cent on such actual cost for each year during the period of operation after adequately providing for maintenance and depreciation of the property and safeguarding the investment.

Referring to Mr. Loewenstein's impressions of railway service in Sydney, Mr. Duffy remarked that if the speaker had been called upon to pay in taxes his share of the deficit resulting from the operation of the street railway system his impressions might be different. In conclusion, he said that no privately-owned public-utility company, no investor in any such company and no employee in any such company objects to regulation that means fair treatment and protection to the interests regulated; that such regulation makes a privately-owned public utility stronger and better in every way and is best for the public; that the advanced and progressive privately-owned public-utility company knows full well that if it does not conduct its business according to business principles it cannot, will not and should not succeed and that the privately-owned public utility that gives the best service practicable at the least cost and that serves the public best, serves itself best.

CHICAGO ELEVATED SECTION

Financing electric railways, signals and interlocking were the subjects discussed at the meeting of the Chicago Elevated Railroad Section of the American Electric Railway Association held on June 22. When President Johnson called the meeting to order there were 110 members and guests in attendance and Secretary Smith reported sixteen new applications, which made the total membership 169. In the business session before beginning the regular program, it was suggested that an official pin cheaper than the one adopted should be available for those who could not afford to buy a gold one. This matter will be taken up with the parent association for action.

E. A. Brion, comptroller of the Chicago Elevated Railways, spoke on "How Funds Are Provided for Electric Railway Development." He described the different classes of securities employed, the manner in which they are marketed and the desirability of the various classes. It was shown by concrete example how the return on the various classes of securities varies with their safety and how the demanded return on all securities is steadily advancing. Mr. Brion also spoke of the holding company and its purpose, as well as the various factors which affect the marketing of the securities.

A talk on "Signals and Interlocking" was given by J. W. Stephenson, signal engineer of the company. The history of signal development was outlined beginning with the installation of the red ball at the crossing of the New York, New Haven & Hartford and the New England Railroads at Hartford, Conn., in 1852. Various types of interlocking machines installed on the Chicago Elevated Railroads were described, and the members were informed of several features which were developed on the company's lines, such as the "hesitation" frogs and the detector route locking.

"The Life of Treated Gears and Pinions" was the principal subject brought out by the Question Box and this was discussed at length. It was decided that this would be the last meeting before the summer adjournment. It is believed the section will be kept very much alive during the summer by the activities of the members who desire to be elected as delegates to the national convention at San Francisco.

The Anthony N. Brady Memorial Medals

The American Museum of Safety is sending to electric railways accident report forms for use in the competition for the Brady memorial medals which were awarded last year for the first time to the Boston Elevated Railway, Russel A. Sears and Henry V. Neal. The committee for formulating the conditions of competition comprise Arthur W. Brady, president Union Traction Company of Indiana, chairman; Wilbur C. Fisk, president Hudson & Manhattan Railroad; C. S. Sergeant, vice-president Boston Elevated Railway and W. H. Tolman, secretary, director American Museum of Safety. The committee on awards consists of Bion J. Arnold, chairman Board of Supervising Engineers, Chicago Traction; Hon. W. J. French, commissioner Industrial Accident Commission, State of California; James H. McGraw, president McGraw Publishing Company; Frank J. Sprague, New York; Prof. George F. Swain, chairman Boston Transit Commission, and Dr. W. H. Tolman, secretary.

The conditions of the competition are substantially the same as last year, but they have been improved in detail in accordance with suggestions received by the committee. They are contained in a circular published by the American Museum of Safety, 14 West Twenty-fourth Street, New York.

Equipment and Its Maintenance

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

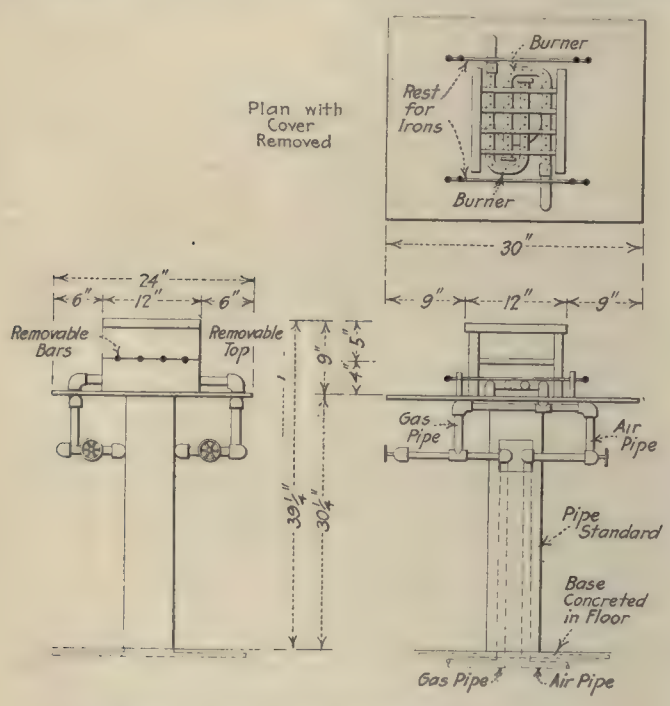
(Contributions from the Men in the Field Are Solicited and Will be Paid for at Special Rates.)

Furnace for Heating Soldering Irons

BY R. H. PARSONS, ELECTRICAL FOREMAN

The gas furnace illustrated in the accompanying drawing was designed for use in heating soldering irons and solder pots in shops where a number of men, say from six to ten, are winding, repairing and bending armatures. It is a home-made furnace set up in the following manner:

The stand consists of a piece of 6-in. pipe, 30 in. long, with a table welded on the top and a base welded on the bottom. The table is 30 in. long, 24 in. wide and



FURNACE FOR HEATING SOLDERING IRONS

½ in. thick. The base is somewhat smaller and is imbedded in the concrete floor a few inches below the surface.

On the table is a cast-iron box, housing the burners, and consisting simply of two sides with a heavy, removable top, the whole box being in two parts held together by dowel pins. The top may thus be lifted off to expose the burners. The division of the box into two sections also gives a convenient means for replacing the small bars which are provided over the burner to support the irons. As these are in the flame they warp and have to be changed occasionally. The provision of the removable top also makes the furnace available for heating solder pots, boiling water, heating irons for light blacksmith work, etc.

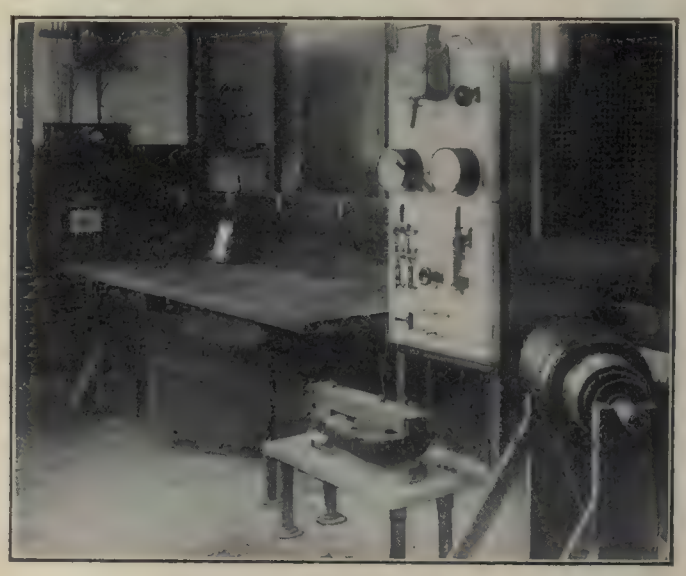
The burners are U-shaped loops of half-inch pipe perforated with ⅛-in. holes. They are laid together in the overlapping position shown in the diagram. Two ¾-in. pipes, one each for air and gas, are brought up from below the floor through the stem to a large opening near the top whence they lead to the burners. A valve is inserted in each pipe just below the table. Fastened to the flat iron top on each side of the burner is a bar, shaped to form a rest for the soldering-iron handles.

In designing this furnace, economy, neatness, convenience and safety were the considerations. The use of one central furnace does away with numerous individual fires, thus economizing fuel and insuring more nearly continuous use of the one fire. The inclosing of the pipes in the stem conduces to neatness, and the furnace is adapted to be centrally located for easy access by the users. The elimination of many small fires is conducive to safety and as this outfit is entirely of iron it is inherently fire proof.

Testing Corner in Atlantic City Shops

BY GEORGE F. FABER, GENERAL SUPERINTENDENT ATLANTIC CITY & SHORE RAILROAD

For the purpose of making the standard as well as special tests of electrical equipment, the arrangement of apparatus shown in the accompanying illustration has been adopted. At the left is shown an 1100-volt transformer used for break-down tests and beneath it a transformer and wattmeter board on which is an a.c. watt-hour meter and alongside it a switch in the low-voltage a.c. circuit leading to the transformer, by opening which the a.c. line to the main switchboard is killed.



TESTING CORNER IN ATLANTIC CITY & SHORE RAILROAD SHOPS

The principal instruments and switches are grouped on a small home-made switchboard consisting of two marble panels, which happened to be on hand, mounted on an angle-iron frame.

At the top of the board is a d.c. circuit breaker, to the right of which is a snap switch and pair of terminals for the d.c. voltmeter. In the center at the right is a d.c. ammeter arranged with shunts for reading either

100 or 1000 amperes. The range is controlled by two single-pole switches which short-circuit the respective shunts. The low-amperage switch is to the left of the ammeter and the high-amperage switch below it. To the left of the d.c. ammeter is a 60-amp. a.c. ammeter with a short-circuiting switch immediately beside it. Below the a.c. ammeter is the main a.c. circuit switch with fuses, and at the bottom of the board is a double-pole double-throw switch, connected in one direction for the field test and in the other for the armature test. Connections to the equipment under test are made from behind the board.

Immediately below the board is a water rheostat, consisting of an iron terminal plate suspended in an oil barrel concreted in for permanency. The barrel is provided with a drain pipe at the bottom so that the standing water may be changed as often as desired. The position of the terminal plate is controlled by a rope running over a drum on the back of the board. The drum is rotated by means of a small hand wheel on the front of the board. A weight is used to counterbalance the plate.

On the stand in front of the switchboard is a transformer for testing field coils for short circuits, consisting of a laminated iron core with a primary winding, the coil under test forming the secondary. The illustration shows the field coil of a Westinghouse No. 68 motor ready for short-circuit test, while the armature of the same motor is on the stand at the right ready for current and insulation tests. In addition to the test set described we have a K-36 controller mounted with circuit breaker and resistances for complete test of motors before they are installed on the trucks.

The testing equipment described above is used for making the following routine and special tests: 1100-volt a.c. insulation tests on armatures and other apparatus; a.c. field tests for "shorts"; a.c. armature tests for "shorts"; d.c. circuit-breaker tests; ohmic resistance tests of any apparatus, and in general any other a.c. or d.c. tests requiring large or small current. While I am aware that test sets are installed in most of the larger electric railway shops throughout the country, I believe that the arrangement of this one will be of interest as it is quite complete.

Ventilation Holes in Motor Frames

BY F. A. MILLER, SUPERINTENDENT POWER AND EQUIPMENT OAKLAND, ANTIOCH & EASTERN RAILWAY

R. H. Parsons' article in the issue of the ELECTRIC RAILWAY JOURNAL for June 19, on "A Simple Ventilating Scheme for Increasing Motor Output" recalls to the mind of the writer similar work which was carried out when he was with the Puget Sound Electric Railway in 1911.

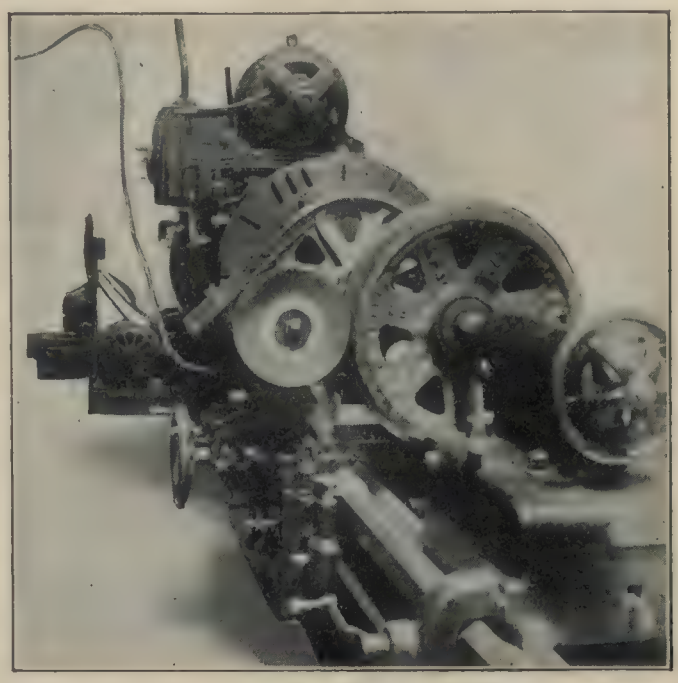
The company had in service a number of GE-66 motors geared 47:37. The operating conditions of these motors were so severe that with an outside temperature of 34 deg. C. the internal temperature of the motors ran as high as 105 deg. between the field poles. These high temperatures caused the melting of the solder in the rear-end clips of the two-piece armature coils, necessitating rewinding.

We therefore removed the standard handhole covers and replaced them with pieces of sheet iron in which 9/16-in. holes had been perforated at about the same distance between the edges of the holes. With the perforated covers substituted for the top handhole covers alone, the maximum temperature dropped to 77 deg.; and with the top, back and bottom handhole covers perforated, the temperature fell to 60 deg. and even to 55 deg. C.

A Home-Made Wheel Grinder

BY GEORGE G. MORSE, SUPERINTENDENT OF RAILWAYS, EL PASO (TEX.) ELECTRIC RAILWAY COMPANY

The accompanying photograph shows a device made in our shops for grinding wheels. This consists of a 1-hp. motor, with an emery wheel attached, fitted to the tool holder of our 36-in. wheel lathe. This attachment is secured to the tool holder by four bolts so that it can be removed quickly when necessary. We are, of course, able to grind but one wheel at a time with this device.



EL PASO RAILWAY HOME-MADE WHEEL GRINDER

The average time required to grind a pair of wheels is from two to three hours, depending on how badly they are skidded. We have been using this device since January, 1914, grinding from one to four pairs of wheels per month. We have lately used it for truing up steel wheels where there was a slight difference in diameter and in case the flanges did not require turning. The entire cost of this installation was $50, including the cost of a second-hand motor.

Emergency Truck Changing at Los Angeles

The accompanying cut shows a vehicle used by the shop forces of the Los Angeles Railway. This is used to carry a completely-equipped motor truck which is always ready for emergency replacements at the call

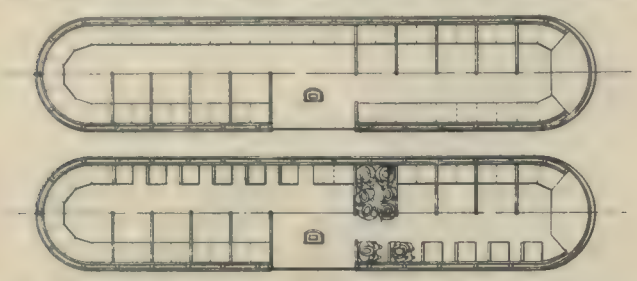
DOLLY WITH COMPLETELY EQUIPPED MOTOR TRUCK FOR EMERGENCY REPLACEMENTS

of the chief dispatcher. The dolly is supplied with a skidby means of which the replacing truck is readily lowered and the defective truck raised to the platform for return to the shops.

Making the Standee Comfortable

A patent, No. 1,142,867, has been issued by the United States Patent Office under date of June 15, 1915, which proposes the separation of surface-car interiors into small sections or units each providing standing space for a limited number of passengers. By segregating each unit every individual within such a space has a place from which he cannot be crowded and at the same time the railings surrounding the unit provide him with a firm and natural support during his ride.

The accompanying Figs. 1 and 2 show plans of a center-entrance motor car having an aisle which is off the center line of the car and thus provides room for the series of units along one side of the car. The units



FIGS. 1 AND 2—PLANS OF TYPICAL CENTER-ENTRANCE CARS SHOWING LOCATION OF RAILWAYS BETWEEN COMPARTMENTS

are separated from each other by horizontal pipe railings which are set about waist high and which may take either the form of an attachment to a vertical stanchion at the seat line or else continuous railing running horizontally from the car side to the center line. Wooden partitions are suggested for use in some cases.

The plan shown in Fig. 2 differs from that shown in Fig. 1 only in having the single seats arranged in tandem. The latter feature, by locating the foot space for seated passengers between the cross-seats, makes available for standing passengers a corresponding space in the aisle, and in addition insures those who occupy the cross-seats from close contact with those who stand. In Fig. 1 the plan provides for two seated passengers and four standing passengers in each unit.

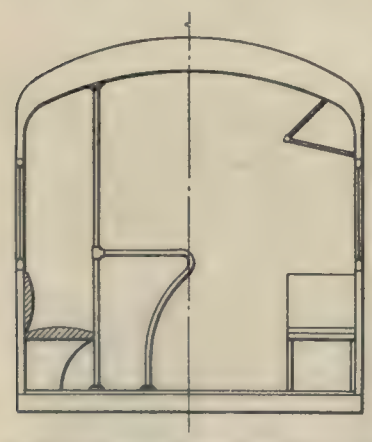
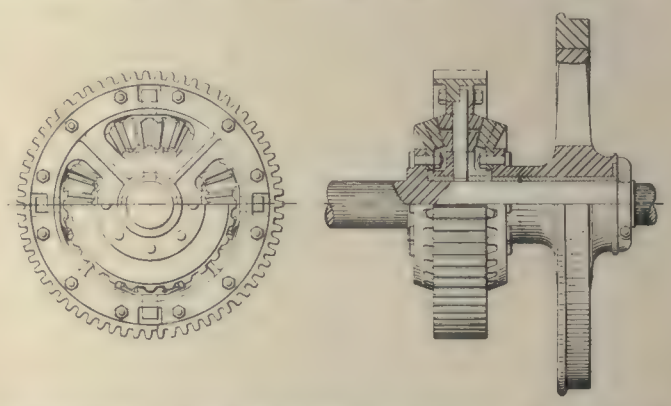


FIG. 3—CROSS-SECTION OF CAR SHOWING ARRANGEMENT OF RAILINGS

The inventors believe that this arrangement will prove superior to the use of both hand straps and stanchions because the horizontal partitions between the units will provide definite support for standing passengers at the proper position. It is also believed that the race for vacant seats which is a conspicuous and unpleasant feature of modern rush-hour travel will be eliminated, because passengers who have once gained a standing place within a given compartment acquire a natural right to vacancies within their compartment.

Differential Gears to Eliminate Rail Corrugation

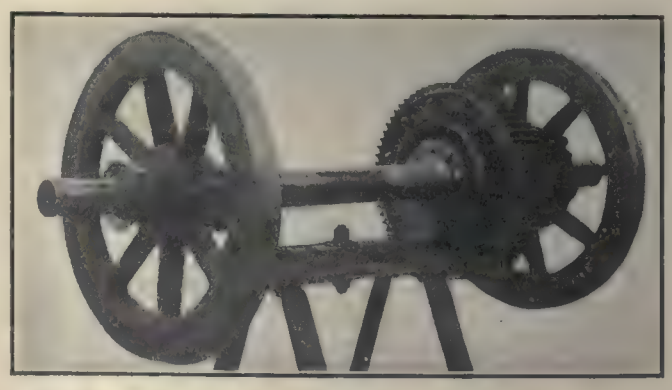
For a number of months the Huddersfield Corporation Tramways, Huddersfield, England, has had in operation eleven cars fitted with differential driving gears. These cars have been operated on track which was formerly subject to corrugation, to the exclusion of other cars, to determine primarily the effect of eliminating wheel slippage. Incidentally information was desired upon the subject of energy consumption and life of tires with wheel slippage eliminated. It was the theory of R. H. Wilkinson, general manager and engineer of the tramways, that corrugations are caused by skidding and slipping of the wheels due to unequal diameter. If this theory is correct the elimination of slipping should have beneficial effects in the three di-



DIFFERENTIAL GEARS—SECTION SHOWING DETAILS OF CONSTRUCTION

rections indicated. Experience thus far has shown very satisfactory results as regards corrugation and tire wear, although there have been no appreciable energy savings. The cars are running on rails which were corrugated by cars of the ordinary fixed wheel and axle type. For the purpose of the experiment the corrugations were carefully ground out.

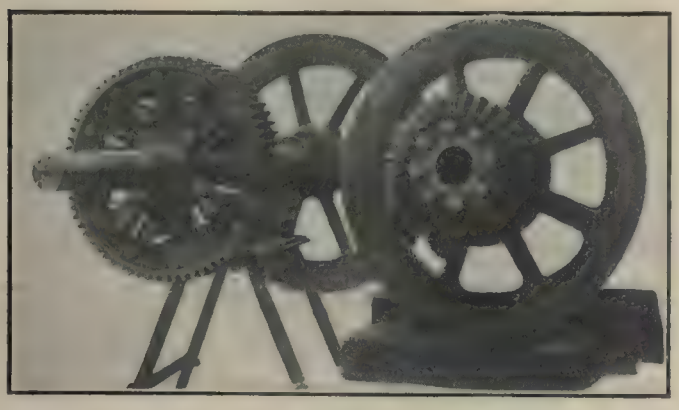
The construction of the differential gear can be seen from the illustrations. Referring to the line cut it will be noted that a differential driving axle gear is substituted for the ordinary gear one side driving the near wheel through a bevel gear mounted on the extension of its hub, while the other side drives the far wheel through the axle, which carries a similar bevel gear mounted on a collar forming an integral part of the axle. By this drive each wheel takes a speed determined by its circumference. The axle is carried in ordinary bearings. The wheels differ from the standard wheels in that they are straight rather than dished, in order to bring the tread and point of support more directly under the center of the length of the wheel boss and bearings,



DIFFERENTIAL GEARS—COMPLETE GEAR ON CAR AXLE

the better to support the axle equally over the full length of the boss bearings, giving parallel wear of bush and axle by approaching center running.

It will be noted that the wheel near the differential gear is mounted loose on the axle, the hub being bushed with a bronze bearing, while an extension of the hub carries the bevel gear. The appearance of the gear as attached to the wheel is shown clearly in one of the halftones. The main spur axle gear is also loose on the axle and is similarly bushed. It consists of a cast-steel rim with machine cut teeth mounted on a cast-steel center which carries four bevel pinions meshing with



DIFFERENTIAL GEARS—SPUR GEAR WITH BEVEL PINIONS, AND BEVEL GEAR ON WHEEL HUB

the aforesaid bevel gear. The second bevel driving gear is bolted to a collar which is forged on the axle. All of these parts are securely bolted together with driving-fit bolts.

A thrust collar, made in halves bolted together, fits snugly into a groove in the axle on the outer side of the wheel, to take the thrust of the bevel gears. This construction permits the easy removal of the gears so that they may be lined up in case of wear.

The experiments which are being made with these differential gear drives should be of great value in settling questions as to the causes of corrugation, the effects of wheel slippage on curves, etc., and the effect on tire wear of inequalities in wheel diameter.

All-Steel Cars for London & Port Stanley Railway

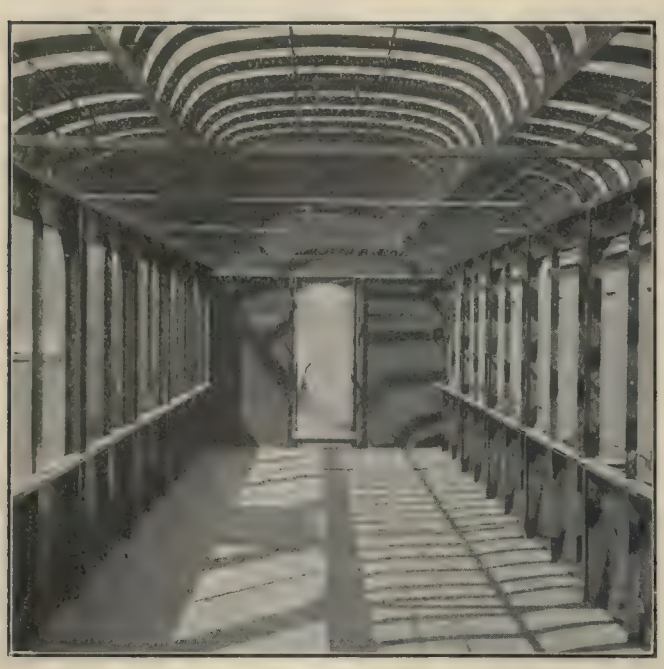
Five cars for the London & Port Stanley Railway have recently been completed by the Jewett Car Company, the design providing for service in accordance with the highest interurban standards. The railway, which is a 1500-volt electrification of an old steam road between the cities of London and Port Stanley in the province of Ontario, Canada, really constitutes a first step in the extensive general plans of the Ontario Municipal Railways, and the service includes locomotive-hauled freight trains and multiple-unit passenger car trains of both limited and local classes.

The recently completed cars are to be used in motor service at the head ends of the two-car trains. They are 61 ft. 1¾ in. long over buffers and are exceptionally wide, being 9 ft. 6 in. over posts. This makes possible seats that are 40 in. long, with an aisle 26 in. wide. The car body is divided into baggage, smoking and general passenger compartments, respectively 9 ft., 12 ft. and 25 ft. in approximate length. In the main compartment there are two saloons with metal tile walls and a tile floor set in cement. The seats in the main and smoking compartments are on 34-in. centers, and the total seating capacity is fifty-six.

The bottom framing of the car is made up of structural sills with pressed-steel cross-bridging, plate bolsters with pressed-steel fillers being used. Side posts are alternately of double channels and tees of light section, with angle-iron corner posts. The posts at the bulkheads and partitions are also of channels, with a channel header across between side plates. All of these posts have light wood fillers. The entire outside of the car and the bulkheads are composed of steel plates, the side girder plates and letter boards being of ⅛-in. steel and the pier-post panels, etc., being 3/32 in. thick. The carlines are of pressed steel, and the roof is sheathed with steel plates laid across the full width of the car.

The cars are fitted with extra heavy steel pilots and Tomlinson M. C. B. drawbars. The interior finish is mahogany, inlaid with inside and outside Gothic sash and cathedral glass, and storm sash are fitted to all body windows. The ceiling is of agasote, while the

PORT STANLEY CARS—VIEW AT VESTIBULE END, SHOWING DOOR ARRANGEMENT



PORT STANLEY CARS—VIEW SHOWING SIDE FRAMING AND METHOD OF ATTACHING CARLINES TO DECK SILL

PORT STANLEY CARS—INTERIOR VIEW, SHOWING STYLE OF FINISH IN PASSENGER COMPARTMENT

floor, which is of wood, is covered with linoleum. The car is lighted by semi-indirect system with pendant fixtures, light wiring being in concealed conduit. The heater wiring is also concealed.

There is a vestibule only on the rear end, and this has triple steps covered with Edward's steel trapdoors. Both saloons are very completely equipped with flush hoppers, wash stands with liquid soap holders, towel racks, etc., all toilet-room fixtures being nickelplated. The interior of the car presents an exceptionally tasteful appearance, the mahogany being finished in a rather light tone, and great care has been exercised in selecting soft harmonizing colors both for ceiling and for stained glass.

Nothing in the way of incidental equipment, such as buzzers, air sanders, fire extinguishers, etc., has been omitted, while a large switch cabinet with a slate back extends from floor to ceiling, this containing all electrical switches. The roof is a compromise arch design having an ogee curve on each side, making a very good lines especially in the hood.

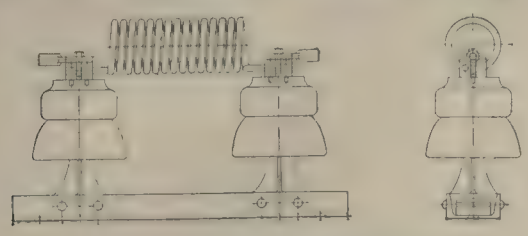
The electrical equipment for each car consists of four General Electric ventilated motors of 125-hp. hourly rating, connected permanently in series groups of two. The insulation, however, is designed for 1500 volts. The control is double end and energy for this is derived from a 1500-600-volt dynamotor which will have a sufficient capacity also to light the motor car and its trailer as well. Pantographs will be used for current collection. Each car will carry a combined straight and automatic air-brake outfit of the variable release type supplied by 1500-volt air compressors.

PORT STANLEY CARS—CAR BODY PRIOR TO INSTALLATION OF ROOF SHEATHING

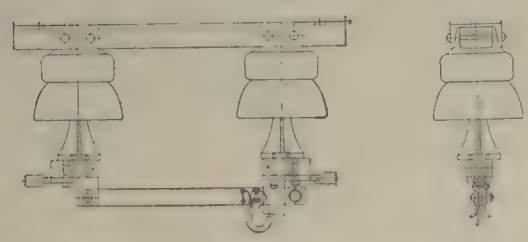
Choke Coils and Disconnecting Switches

The choke coil, disconnecting switch and fittings illustrated herewith are typical of the new and more complete line of such apparatus recently brought out by the Electric Service Supplies Company, Philadelphia, Pa. The fittings which accompany this line are all of new designs and especially noteworthy.

Both choke coils and disconnecting switches are made for standard and underhung mounting, as well as for

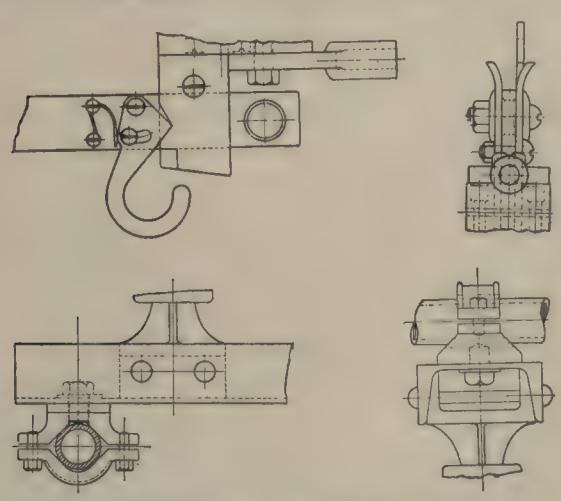


CHOKE COIL—STANDARD MOUNTING



UNDERHUNG DISCONNECTING SWITCH

voltages up to 35,000 and all standard ampere capacities. They are made with a base of channel iron, either 3-in. or 4-in., depending on the size of the coil or switch. Iron pins are riveted into this channel, and insulators cemented to these pins support iron caps, which in turn support the terminal blocks, terminals and coil or switch proper. All channel bases are drilled with 9/16-in. holes in each end and, therefore, may be mounted on any flat supporting member by bolts or lags. These coils and switches are very rugged in construction and possess great electrical and mechanical strength. The switches are designed for disconnecting and controlling



SWITCH LOCK AND PIPE CLAMP

high-voltage lines, branch feeders, emergency feeders, etc., as well as for lightning arrester disconnecting switches that are installed to disconnect arresters from the line for the purpose of inspection or repair. The manufacturers claim that these devices are so designed that when they are used in conjunction with Garton-Daniels lightning arresters, a maximum of protection may be expected.

The line of fittings referred to consists of malleable iron pipe clamps for mounting switches or coils on either parallel or transverse piping, disconnecting switch locks for use particularly on underhung types as assurance against any tendency for the blade to be blown open, disconnecting switch stops which prevent the blade from opening beyond a given angle, switch blade operating attachments which provide an extra large hole in the switch blade to facilitate the quick opening of the switch in an emergency, and disconnecting switch hooks in lengths from 4 ft. to 12 ft. for operating the switches from a distance.

A Novel Form of Motor Bus for Interurban Service

There will soon be placed in service between St. Paul and Minneapolis a novel transportation unit that is called a "highway coach" by its builders, the McKeen Motor Car Company, Omaha, Neb. This is stated to be not an omnibus, not a street car and not a jitney bus, but the most comfortable, luxurious, exclusive and up-to-date means of transportation in urban or interurban passenger service. It will compete for the Twin City Rapid Transit Company's intercity traffic at twice the fare charged heretofore, the rate between cities being 20 cents and the local rides costing 10 cents.

The highway coach is equipped with individual chairs

HIGHWAY COACH FOR MINNEAPOLIS

of a new, steel-spiral-spring, pneumatic shock-absorbing cushioned type. This embodies all the cushioning effects of a 2-ft. spiral spring, and it has four air cushions operating in conjunction with it and differentiated on each other, the combination acting both as a cushion and shock absorber. The car is guaranteed by its builders to afford the most easy-riding method of transportation known to man.

Plate-glass, air-tight, round windows afford an almost uninterrupted panoramic view in all directions, the window when open being hinged to the ceiling and giving a full opening of 24½ in. in diameter. Exhaust suction ventilators on the roof maintain constant circulation and removal of the air. The car is electrically lighted, and between each two windows is an electric push button for convenience of passengers in signaling the driver, who controls the two door-operating mechanisms.

Entrance to the car is gained through a two-leaf outward folding door beside the driver's position, the prepayment fare collection being under his supervision. Exit is through double-leaf outward folding door in the side near the rear. Instead of a high step from the mud, the passengers take this car at the curb, the coach entrance being only 15 in. from the ground and the initial step about 7 in. high.

Adequate heating facilities for the car are obtained

from the waste products of the gasoline engine, there being twice the necessary heat units available for maintaining the proper temperature of the interior of this car in the coldest of winter days, and with this large supply of waste heat there is no additional expense in providing the passengers with plenty of moderately heated fresh air.

The chassis is a 3½-ton gasoline truck, having a wheelbase of 216 in. The length of the frame behind driver's seat is 22 ft. The coach may be equipped either with rubber tired wheels for road service or with flanged wheels for use on urban rail lines.

Light-Weight Car for Cleveland & Eastern Traction Company

A car that has just been completed by the G. C. Kuhlman Car Company for the Cleveland & Eastern Traction Company, possesses to an exceptional degree the feature of light weight that has recently become prominent in interurban car design. The railway company's lines extend east from Cleveland to Middlefield, with a branch to Chardon, a town of 1400 population. The land in this region is somewhat hilly, but lends itself to general farming, the principal industry which supports a population of 15,500, and the new car will be operated between the interurban terminal at the Public Square of Cleveland and Chardon, a run of 32 miles. It will make an average number of stops of four per mile, the maximum grade encountered being 11 per cent.

In the design of the car the utmost attention was given to the elimination of all unnecessary weight, and, in view of the fact that no sacrifice of strength or omission of equipment for obtaining the most efficient and safe operation was made, the result is extremely interesting, as is shown in the accompanying table, in which for comparative purposes is included a table of dimensions and weights published in a recent issue of ELECTRIC RAILWAY JOURNAL.

STEEL CONSTRUCTION

The underframe is composed of angle side sills with eleven light I-beam crossings between the bolsters; the end sills are made in the form of a trussed frame, with angles at the top and channels at the bottom. Diagonals at each end are arranged to serve as center knees, and are brought well back of the bolster. They are strongly reinforced with angle gussets at the trussed end sills. A powerful construction for the attachment of the drawbars and anchors consists of angles and plates riveted to I-beams extending from the bolster to the end sill. The bolsters are made up of pressed steel diaphragms with 10-in. top and bottom members. At the rear platform the outside knees are omitted to provide an opening for the steps, and the angle forming the roof framing and the angle at the top chord of the side frame extend through to the corner post and aid to support the outer portion of the platform by means of structural steel connections.

CLEVELAND & EASTERN CAR—INTERIOR VIEW LOOKING TOWARD FRONT PLATFORM

Each side of the car, from the side sill of the underframe to the top plate, is constructed to form a girder.

	Cleve. & East	Fostoria	Union Trac.	Chicago
Over-all length	54 ft. 6 in.	56 ft. 9½ in.	61 ft. 0 in.	48 ft. 0 in.
Over-all width	8 ft. 6 in.	8 ft. 6½ in.	8 ft. 0½ in.	8 ft. 8 3/16 in.
Weight of body	23,186 lb.	29,550 lb.	45,200 lb.	35,600 lb.
Weight of trucks and equipment	36,214 lb.	38,450 lb.	40,400 lb.	34,900 lb.
Total weight	59,400 lb.	68,000 lb.	85,600 lb.	70,500 lb.

of which the principal member is a continuous plate of 3/32-in. steel riveted to the side sill angle, steel belt rail and the posts. The posts are of tee-section, and are alternately single and double, on account of the twin-window arrangement. The top chord of the girder consists of an angle riveted to all post heads. Additional stiffness is imparted to the girder by means of a continuous sash rail at the bottom of the top sash which is dadoed over each side post.

The roof framing consists of an angle on each side, with the horizontal web turned in, and steel carlines riveted to the vertical web. Wooden nailing strips are bolted to the carlines, and canvas nailing strips are bolted to the angle roof sills. After the roof was placed on the carbody, the side angles were riveted to the angle top chord of the side girder.

CLEVELAND & EASTERN CAR—SIDE VIEW SHOWING WINDOW AND DOOR ARRANGEMENT

The front and rear vestiblues are framed alike; the sheathing around the front end is of the same thickness as the side plates, while at the rear end it is composed of No. 14 sheet steel. The letterboards are made of sheet steel, and continue in line with the side letter panels.

INTERIOR DETAILS

There is a double flooring, the bottom layer of yellow pine and the top of maple, except at the aisle, where interlocking tiling extends the full length of the carbody proper. The tops of the trap doors over the steps and the floor between the steps and the rear platform are also covered with interlociking tiling, cemented to maple flooring.

The headlinings are composed of sheet steel and installed in a continuous piece from the curtain box molding on one side to the same point on the opposite side, and are the length of two windows, except at the center, where they are cut to suit the partition. The only longitudinal moldings are those for the curtain boxes and advertising signs, and for covering the joints of the headlining; the latter are painted the same color as the headlining.

CLEVELAND & EASTERN CAR—INCLOSURE FOR PACKAGES AND MAIL ON FRONT PLATFORM

The lower side sashes have brass sash stiles, and are capable of being raised their full height. The upper sashes, as has been already stated, are made in a continuous section and are glazed with pressed prism Gothic glass. An interesting feature of the windows is a novel type of window guard, which is made of strongly framed diamond mesh wire screens. The window guards are attached to the bottom of the lower sashes and slide into pockets in the side walls when the sashes are lowered. When a sash with its screen guard is raised, the lower part of the screen guard covers the pocket opening, and thus prevents rubbish from being forced into the pocket. The inside lining below the windows consists of sheet steel.

The partitions between the motorman's compartment and smoking compartment, and between the smoking compartment and main compartment are of African mahogany. They are glazed in the upper part and have single sliding doors. On the left side of the car, next to the rear platform, is a toilet room with standard appointments and with a flooring consisting of a single slab of marble.

SEATING ARRANGEMENT

All of the seats are placed transversely, with the exception of the one opposite the toilet room. The type used is a non-reversible, light-weight seat, made without seat rails and having the pedestal and seat back support of pressed steel in one piece. The wall plate is pressed in one piece to form the back support at the wall end. The seats are upholstered in twill-woven rattan, and are of Brill manufacture. The total seating capacity is sixty-three, seventeen seats being located in the smoking compartment which has a transverse seat along the front bulkhead with a folding seat opposite the space at the door to the motorman's compartment. Continuous parcel racks are provided in both compartments, and a package and mail cage is located at the rear of the motorman's platform.

Twelve Brill "Exhaust" ventilators, six on each side of the roof, are installed and these have regulating registers attached to the headlining. The equipment includes hot-water heating system, air brakes, automatic air couplers, fender, sand boxes, trolley retriever, anti-climber bumpers, registers, signal lamps, air whistle, etc., and the car is mounted on Brill 27-MCB-2X trucks, which have a wheel base of 6 ft. 9 in., 34-in. wheels, and are suitable for a speed of 50 m.p.h. They are equipped with four 65-hp. motors per car. The bolster centers are 31 ft. 9⅛ in., and the trucks are arranged to radiate on a curve of 37 ft. 6 in.

The Aeroscope at the Panama-Pacific Exposition

One of the most astonishing of the amusement devices installed at the Panama-Pacific Exposition at San Francisco is one which raises its passengers to an elevation of 330 ft. above sea level and provides a sea horizon of 200 miles. This is called the Strauss Aeroscope and it is reported to be the largest passenger-carrying machine ever built. However, on a smaller scale it would be peculiarly adaptable to ordinary amusement parks.

The device is fundamentally a Strauss trunnion bascule bridge mounted on a revolvable tower. The tower in turn is mounted on a series of eight trucks which travel on a circular railway track 60 ft. in diameter, four of the trucks being provided with 15-hp motors and trains of gears to drive them in either direction. At the apex of the tower, 48 ft. above ground, are mounted two 15-in. shafts, or trunnions, and upon them the huge arm of the structure is mounted. This projects 200 ft. in front of the trunnions and 38½ ft. behind them, the rear end carrying a 380-ton counter weight that is made of reinforced concrete. The rear end of the arm is provided with two circular racks which are engaged by pinions driven by two 11-hp motors, and these raise or lower the arm as desired. The arm is provided also with two air propellers mounted near the end. These propellers are driven by a 3-hp motor and they assist in raising the arm and in steadying its motion.

As an amusement device pure and simple, the Aeroscope is unique. The tower and its car are brilliantly illuminated at night and as the lines of the structure are graceful throughout it is particularly inspiring after dark. It moves majestically, each trip consuming ten minutes, and the view afforded from the car is unparalleled. The total capacity per day approximates 6000 passengers, and during the first four weeks of the exposition the Aeroscope carried 65,000 patrons.

The importance of the bascule bridge principle, as applied in the aeroscope, has even been recognized by the United States government which, it is reported, has arranged with the constructors for the application of

AEROSCOPE IN REVOLVABLE POSITION

the principle to military searchlight towers to be erected at the various coast-line fortifications.

Absolute safety for the passenger is guaranteed by the provision of both power and handbrakes under the control of an operator who travels with the car, provision having been made in the design for a wind velocity of 60 m.p.h.

Self-Lubricating Brushes

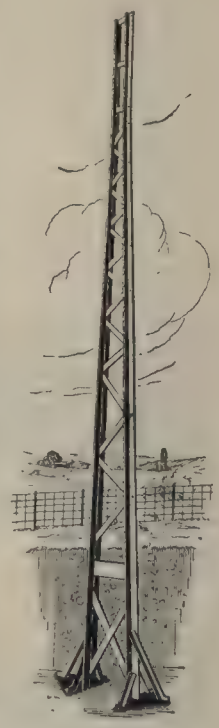
The "No-Spark" carbon brush manufactured by the Calebaugh Self-Lubricating Carbon Company has been making a remarkably successful record on several electric railways, the principal feature being an ability to run without chipping, splitting, or breaking. This has been demonstrated on the lines of the Lehigh Valley Traction Company where a number of test sets of the brushes have been installed.

Harry Branson, superintendent of equipment of this system, states that a test set of brushes recently removed from a car on the Bethlehem Division had made a mileage of 24,957 and had given excellent results, having been installed in Westinghouse 101-B motors. Other brushes of the same type are in service on Westinghouse 303 and 38-B motors, used elsewhere on the system, but these have not yet been removed because their condition is good. The commutators are all in excellent shape.

The makers claim that the "No-Spark" brush makes a frictionless contact because of its self-lubricating qualities and that it reduces the commutator wear 90 per cent, giving a dark-brown gloss on the commutator surface in a very short time after application. It will, in consequence, carry some 50 per cent more load than that normally allowed per brush and is moisture-proof as well as fracture-proof. Naturally, the sparking is reduced to the absolute minimum.

New Type of Steel Pole

A novelty in poles recently brought out by the Carbo Steel Post Company, Chicago, makes use of the revolutionary but logical principle that pole legs should be anchored under ground (thus putting the legs in straight tension or compression when a transverse force is applied) instead of being set in concrete to form a cantilever with the bending stresses localized at the ground line.



ANCHORED POLE

The makers believe that rigidity in a direction parellel to the wires on a pole line is undesirable, because if a wire should break the load is concentrated on the two poles at the break. If flexibility is provided the poles bend until the unbalanced force exerted by the wires is transmitted back from the break to a large number of the other poles, thus preventing actual failure of any pole. In consequence both the transmission line poles and the trolley poles designed by the company are of a modified A-frame type with the long dimension transverse with the line.

The poles are buried about 4 ft. or more in the ground, and each leg is provided with anchor plates to hold the feet of the pole firmly in place through the weight of earth resting on them. At the ground line is a sway plate that extends between the legs, giving a certain amount of longitudinal resistance to pull. Rusting at or below the ground line is prevented by a special finish which is stated to be proof against moisture and alkaline soils.

The material used in the construction of the poles is a high-carbon steel of uniform texture with an elastic limit over 50,000 lb., thus providing the desired lightness. It is stated that this metal will not pit even if left unpainted, and on this account the life is long in comparison to the ten or twelve years' use to be expected from wooden poles. The first cost, pole for pole, is reported to be about the same for wooden poles and for the new design, but owing to the superior strength of the latter only about half as many poles per mile are required. The total cost of a light transmission line with the new poles is estimated to be about three-fourths of the cost involved when wooden poles are used.

Effects of Heat Treatment on Nickel and Manganese Steel

In a paper presented before the American Society of Mechanical Engineers at Buffalo recently, Robert R. Abbott stated that for a heat-treated 1½ per cent plain manganese steel, the manganese in excess of that contained in a nickel-manganese steel of a corresponding carbon content (about 0.34 per cent) exerts a strengthening effect equivalent to that of about three times the same amount of nickel. While the effect of manganese on a steel which has not been heat-treated is to increase the toughness slightly, its effect upon a heat-treated steel is decidedly the reverse. In the case of nickel the effect upon an untreated steel is practically zero, while in a heat-treated steel nickel increases the toughness decidedly. An untreated steel containing about 1½ per cent of manganese is fully as tough and is stronger than a nickel steel of about 3¼ per cent nickel.

LONDON LETTER

Women Fast Taking the Places in Tramway Service of Men Needed at the Front

(*From Our Regular Correspondent*)

Fifty additional women have started training as car conductors in the service of the Glasgow Corporation Tramways Department, bringing the total number of their sex on active duty or in training to 250. The places of so many men have to be filled that it is expected the number of women appointed will soon reach 500. The list of women applicants now contains about 1400 names.

The traffic receipts on the Glasgow Tramways during the last financial year amounted to £1,070,353, being £8,083 less than in the preceding year. The count of the actual number of passengers carried during the year has not yet been completed, but up till May 29, which leaves only two days short in the year, the figures were 334,584,216, as compared with 334,676,627 in the corresponding period of the preceding year. Taking into account the exception of these two days' statistics and the circumstances of the war during the past ten months, the total number of passengers carried during the year which began on June 1, 1914, compares very favorably with the preceding year's total of 336,654,624..

The Coventry City Council has decided to employ a dozen women conductors. The women are to be between thirty and forty years of age, to work forty-eight hours a week, receive 6½d. an hour wages and wear uniforms.

The trolley scheme of the Hove Town Council has been abandoned until after the war. The project has been a source of controversy from its inception in 1911. After a bitter Parliamentary campaign in 1912 the plan received legislative sanction in such a form that both Hove and Brighton were left to pursue their own course, and complications ensued, from which the only escape seemed to be a costly arbitration. Brighton, in fact, was about to apply for the appointment of an arbitrator when the war prevented further proceedings.

The Corporation of Birmingham has decided to increase all the tramcar fares in the aggregate 10 per cent. Assuming that the volume of traffic remains constant, this will result in a gain in the takings of £60,000 per annum. The present rates were fixed in February, 1912, and the proposed alterations will in the main be a reversion to those in operation prior to that date. At present the average penny fare carries a passenger 2 miles 600 yards. When the new scale comes into operation the distance for the same money will be reduced to 1 mile 1200 yards. Outside this radius there will be an increase of a halfpenny on the present rates. As regards workmen's fares, they will go up ½d. on each return ticket. Though passengers in the penny zone will find all the distances curtailed, an increase in the number of overlapping stages will help slightly to improve matters.

At a meeting of the tramways committee of the Newcastle Corporation the general manager reported that since the last meeting of the committee forty-eight women conductors had been trained; that twenty-four were in full charge of cars on the Osborne Road route, and that the rest were in training on the Jesmond route. The general manager expressed his appreciation of the help given by the public to the women conductors, as well as of the services of the inspectors and motormen. Application for further women conductors are desired. The committee has decided to abolish halfpenny workmen's fares, the minimum in future to be 1d.

The Edinburgh & District Tramway is employing on its cars twenty women conductors, who received preliminary training at the depot. The manager has expressed himself as highly satisfied with the manner in which they are performing their duties. The employment of women conductors in Edinburgh, however, is opposed by the tramwaymen. The management has agreed that their employment shall not exceed the period of the war; that efforts will be made by the company to obtain male labor, and that old employees discharged from military service will be replaced in their positions. An amicable settlement has therefore been arrived at, and it is likely that Edinburgh will have many women on the tramways in the very near future.

The Manchester Ratepayers' Association has addressed a letter to the treasury urging it to refuse sanction at present to the carrying out of the Manchester electricity scheme for new works at Barton. It is pointed out that the great amount of skilled labor required for the construction and manning of the new works would cause a serious drain upon the already weakened labor market and tend to draw men away from work immediately necessary for the prosecution of the war, and that there is not likely to be any overwhelming pressure upon the Manchester electricity department for some time.

Owing to the fact that 2000 tramwaymen in Manchester have enlisted, the Manchester Corporation is considering the advisability of engaging women conductors to fill some of the places.

The Salford Corporation tramway workers have accepted the terms offered by the borough tramway committee of a war bonus similar to that recently awarded by arbitration at Newcastle-on-Tyne. The terms are a bonus of 2s. 6d. a week for married men and householders, 1s. 6d. a week for single men, and 1s. a week for youths under the age of eighteen years. The question of the employment of women conductors was discussed at a recent meeting of the men, and a resolution was proposed asking the management to withdraw the women and offering the support of the Salford branch of the men's union and of the Trades and Labor Council in finding suitable male labor for the cars. If these efforts are not successful, however, the resolution provides that the men shall work with the women on certain conditions. The women conductors, of whom sixteen have been trained, are to work on cars running from Weaste to the Cliff and from Irlams-o'-th'-Height to the Market Place, Broughton.

The strike on the London County Council Tramways has now definitely collapsed though it seemed that it would be renewed when the tramways manager's decision to reinstate only men over military age became known. The Council has taken a very firm position as regards this, all men of military age being refused, unless they can show special reasons for exemption from the rule. Mr. Fell has stated that every effort will be made to deal sympathetically with the cases of the men of military age who have good reasons for not enlisting. During the week ended May 12—that before the strike began—the total traffic receipts were £50,891, as compared with £42,779 for the corresponding week in 1914, but for the following three weeks the figures were only £22,460, as against £44,961; £12,610, as against £44,961; and £23,586, as compared with £47,346. No official notification has yet been received from the men's joint strike committee or their unions that the strike is at an end. While before the dispute great difficulty was experienced in maintaining full service, it is estimated that at least 90 per cent of the normal number of cars are now in operation.

Reporting upon recent proceedings before the House of Commons committee regarding new tramway schemes, the London County Council mentions the important fact that, in connection with the proposal for extending the Farrington Road tramways, the chairman of the select committee declared that the committee would very much like to see a scheme to carry the tramways through to South London. So keen, however, was the opposition to many of the schemes that Parliamentary sanction has been granted only in the case of the less important ones—those involving little change and small expense.

Adverse comments were made at a recent meeting of the Birmingham watch committee on the action of tramway conductors who refused to work with a number of women and sent the authorities an ultimatum that if the women were not withdrawn there would be a strike. The committee has been reluctantly compelled to accede to the demand, because the cars are carrying so many munition workers that it cannot run the risk of having them stopped.

The Portsmouth Town Council has decided to engage women conductors to take the place of men who have joined the forces. Of 330 motormen and conductors in the corporation service 137 have enlisted and thirty entered other government service. The women conductors will be paid 5d. an hour, and will be supplied with a uniform.

A. C. S.

News of Electric Railways

THE CHICAGO ARBITRATION

Proceedings Begun on June 28 With the Presentation of Case of the Men

Arbitration of the differences between the Chicago surface and elevated railway companies and their employees was begun on June 28, with Mayor Thompson as umpire, State's Attorney Maclay Hoyne, arbitrator for the employees, and James M. Sheean, representing the railway companies. Eight questions are to be arbitrated and each side has the right to present evidence through counsel. The following are the questions:

1. Percentage of straight runs and consecutive hours in which swing runs shall be completed.
2. Maximum time covered by straight runs on Sundays.
3. Allowances for fall-backs for meals and reliefs, if any, on the streets for meals.
4. Hours of service, including weekdays, Sundays and holidays for employees other than trainmen provided for in this agreement.
5. Number of years to receive maximum wage scale and wages for all trainmen, including trainmen on cinder, sprinkler, supply and other cars.
6. Hours of service and wages paid car repairers, motor repairers, inspectors, dopers, car placers, car cleaners, janitors, terminal men, or other men around carhouses.
7. Allowance for turning-in time.
8. Seniority and efficiency with men outside of train service.
9. Night car hours and wages.
10. With reference to employees outside of the train service the company recognizes seniority of service, but in connection therewith efficiency shall be taken into consideration.

William Quinlan, president of the local union, was the first witness. He gave evidence regarding the methods of employing men in the early days and at the present time, and also outlined the existing working conditions and what he believed should be done to improve them. He claimed that the large and heavier cars, refinements in their equipment and increased vehicular congestion made the work of the motorman increasingly more difficult. Regarding the idle time of extra men between swings, Mr. Quinlan claimed that the men could not engage in other business without obtaining a permit from the company. He said that the present allowance of five minutes for turning-in time should be increased to ten minutes. According to Mr. Quinlan it at one time required only one month to reach the maximum wage scale, whereas it now required six years. This was brought about by the union conceding increased time to reach the maximum whenever a new wage agreement was negotiated.

Mr. Quinlan claimed that the graded scale had discouraged the men and offered an opportunity for abuse, but stated specifically that the present management of the companies had not taken advantage of this. No more accidents were charged against the new men than the old when working conditions were taken into consideration. The fact that the hours of the new men were longer and their runs undesirable as compared with those of the old men accounted largely for the increased number of accidents recorded against them. It was Mr. Quinlan's opinion that a man is as proficient a conductor or a motorman at the end of one year as he ever will be. Questioned regarding wages and working conditions of the employees outside of the train service, Mr. Quinlan said they were paid less than ordinary building laborers while they performed duties requiring much more skill. He also contended that the duties of motormen on sprinklers, cinder, supply and other utility cars were identical with those of the motormen on passenger cars, and he said that the men on these runs should be included in the regular train service.

George W. Miller, attorney for the railway companies, in cross-examination of Mr. Quinlan, brought out that present working conditions were much better than those of the past. He also showed how improvements in car equipment and design had aided in reducing accidents and in decreasing the responsibilities of both motormen and conductors. Prior to 1912 eighteen different transfers were used by the surface lines, whereas only four have been in use since 1912. Regarding swing and split runs, Attorney Miller in his examination of Mr. Quinlan, emphasized the importance of furnishing a service to meet the riding habits of the public and by bringing out that the speed varied with the conditions on the street he refuted the argument regarding the alleged increase in speed. Although Mr. Quinlan claimed the speed had increased he did not know it to be a fact. Mr. Quinlan also acknowledged that long service with the company tended to increase the feeling of responsibility and interest and that high wages added to this increase. Concerning the rotating and standing list of extra men, he claimed that the company preferred the former and the men preferred the latter or standing list. This completed Mr. Quinlan's testimony.

On Tuesday morning, June 29, John Ernst, a cabinetmaker, was examined. Inquiry showed that he was getting 33 cents an hour for steady work, but he believed that he was not being paid enough. On cross-examination it was brought out that he based his idea of the wage he should received upon that received by workers in other shops. M. C. Boyle, a conductor, was examined next. He had been in the service for twenty-seven years and was receiving the maximum wage of 32 cents an hour. This was insufficient. When he entered the service he had $1,000 in the bank. Of this only about $600 was left. He had used about $125 to make up his deficiency in living expenses. He was also examined regarding the transfer system, trip sheets and car loadings.

James M. Sheean, the arbiter selected by the Chicago surface and elevated railways, served as attorney for the Western Railroads in the arbitration of wages and working conditions for the locomotive engineers and firemen. Mr. Sheean was born in November, 1866, at Galena, Ill., was graduated at Beloit College in 1887 and studied law under his father. He was admitted to the bar in 1889, in which year he was taken into partnership with his father and uncle. He moved to Chicago in 1901 and for three years was with the firm of Pan, Calhoun & Glennon. In 1904 the law firm of Calhoun, Lyford & Sheean was organized, and as a member of this firm Mr. Sheean is serving as arbiter for the railway companies. For a number of years he has served as a trial attorney for steam railroads.

Maclay Hoyne, the arbitrator selected by the employees, is State's attorney of Cook County. He was born in Chicago in October, 1872, and was graduated from Williams College in 1895 and Northwestern Law School in 1897. In July, 1913, Mr. Hoyne was appointed assistant corporation counsel of Chicago and two years later was made first assistant corporation counsel. He resigned from this office in June, 1907, to engage in private practice and four years later again was appointed first assistant corporation counsel. In this capacity he served as counsel for the Subway & Harbor Commission and was in immediate charge of the litigation between Chicago and the Peoples Gas, Light & Coke Company regarding gas rates. Mr. Hoyne is also credited with drafting the Chicago 70-cent gas ordinance, upon which issue former Mayor Harrison was elected to his last term of office. Mr. Hoyne was elected State's attorney of Cook County in November, 1912, on the Democratic ticket.

SPRINGFIELD-WORCESTER LABOR AGREEMENT

A new working agreement has been signed by officials of the New England Investment & Security Company and by representatives of the employees' unions on the Springfield (Mass.) Street Railway and the Worcester (Mass.) Consolidated Street Railway to continue in effect from May 31, 1915, to May 31, 1916, taking the place of a three-year agreement which expired on the former date. According to advance reports no increase will be granted the employees of the Springfield company, but there will be an increase on the Worcester lines to a maximum scale of 31 cents an hour, the minimum being 25 cents. The day rate at Springfield will range from $2.30 to $2.85. The agreement practically equalizes the wages on the system under the "nine-hour-in-eleven" law. The full agreement will be made public after ratification by the local unions.

CHICAGO LINES ISSUE STATEMENT

Questions Involved in the Recent Strike Explained by the Companies

On June 18 the Chicago (Ill.) Surface Lines carried in the daily newspapers an advertisement explaining the issues in the controversy that resulted in the suspension of railway service in that city for two days. Its termination was referred to as a victory for arbitration. The statement was concerned with correlated subjects of arbitration, labor and capital and dealt with all three features. The company said in part:

"The question settled in this crisis was not one of wages, hours or other conditions of employment, and was not, we repeat, a question as to whether Chicago should have a strike lasting two days or two months; but the much more fundamental question as to whether men in a twentieth century democracy should settle their differences in accordance with twentieth century ideals and standards, or by recourse to the methods of primitive man and feudal government. The issue was rather as to whether civic progress could be set back, even temporarily, by any group of men, either capitalists or working men, in the second largest city of the most progressive democracy in the world. The result was a victory for the principle that civilized men either should settle their differences face to face and man to man or should leave those differences to an impartial body of their fellow men.

"There was a time when large employers were inclined to reject arbitration and when public service corporations were operated by men who looked upon them as purely private corporations, but that time has passed. There is something to be said, if not in justification, at least in explanation, of the old type of railway builder and corporation operator. Trained in the individualistic school of his time, he believed that he was entitled to the fruits of his labor, and he resented interference with what he considered his private business. His time has passed and a new type of man has taken his place. But the fight which oftentimes is made upon his successors is based upon the belief that the old type still exists.

"The worst that can be said of the type that has passed is that these men held the point of view of their time. Their time has passed never to return; the public has a new point of view and the management of great properties to-day is vested in men whose point of view has changed with the times. All that the men in charge of public corporations ask to-day is that the public realize the change that has come in the ownership and management of such properties; that the men in charge of them are endeavoring—and are succeeding up to the limit of their capacity as men—to put into their business a spirit and practice in accordance with the newer ideals and standards of to-day. They expect no special consideration from the public; they want only fairness, and expect to give it.

"There have been signs in recent controversies between labor and capital that labor itself, after having long ago won capital to the principle of arbitration, was beginning to question, and possibly would reject altogether, this great principle, because it had not at all times resulted favorably, or perhaps even fairly, to the workers.

"As we have stated heretofore, we believe that the principle of arbitration frequently has been misused and misunderstood; but we do not believe that these errors should be charged to the principle itself; nor do we believe that, on account of such errors, the enormous victory of labor in first establishing the principle of arbitration as a means of settling disputes should be lost or forgotten.

"If it be admitted that the older and outworn methods of capital constituted a tyranny, it must be admitted also that a resort to force on the part of labor in these enlightened times would constitute no less a tyranny, not only over the interests of the employer, but over the public interest as well. It is obvious that there can be no gain in the substitution of one tyranny for another, and that the efforts of labor men and employers alike should be directed toward the elimination of all tyranny and the substitution of sound principle, safeguarded by honest men, as we believe the great principle of arbitration has been safeguarded in the agreement under which the present differences are to be adjusted."

CLEVELAND'S FREIGHT TERMINAL

The special committee of the City Council, to which was referred the proposed franchise of the Cleveland & Youngstown Railroad for a freight terminal in Cleveland, was to meet on July 2 to hear arguments on the disputed points between the company and the city. Electrification of the freight yards and the streets to be vacated in the Broadway-Orange Street district are the principal points in contention.

Attorney S. V. McMahon informed the committee on June 24 that the Broadway Improvement Association had employed an engineer to make plans for subways under the proposed terminals at East Twenty-third Street and Pittsburgh Avenue. The company's engineers declared that such plans would be impractical and Mayor Baker expressed the opinion that neither grade crossings nor subways would answer the purpose. He suggested that the city reserve the right to require the construction of overhead bridges. Director of Public Service Sidlo is preparing a report on the proposition. He will probably recommend electrification of the terminals.

THE NEW YORK PUBLIC SERVICE INVESTIGATION

The Thompson committee appointed by the last New York Legislature to inquire into the workings of the New York Public Service Commissions will resume its hearing in New York City on July 15. The new chairman of the committee is Merton S. Lewis, first deputy attorney general. He succeeds Col. William Hayward, now a member of the Public Service Commission for the First District. It will be recalled that Governor Whitman failed to agree with the report of the majority of the committee with respect to the commission for the First District and that he appointed Mr. Hayward to succeed Mr. Maltbie, whose term of office had expired, and vindicated the commissioners. The investigating committee will now concern itself with the public service commission law and with the rapid transit contract in Greater New York and will report its findings to the next Legislature.

ARBITRATION LIKELY AT ALBANY

On the afternoon of June 29 Harry C. Weatherwax, vice-president of the Delaware & Hudson Company, controlling the United Traction Company, Albany, N. Y., and Charles F. Hewitt, general manager of the United Traction Company, agreed to take up again on July 1 the consideration of the questions at issue between the traction company and its employees. The principal question involved is in regard to jurisdiction over all the lines of the United Traction Company by the Amalgamated Association, which objects to the operation into Albany of cars of the Hudson Valley Railway manned by members of the Brotherhood of Locomotive Engineers.

The United Traction Company has issued a statement reviewing this question. The contract between the Hudson Valley Railway and the United Traction Company, both controlled by the same interests, for the operation of through cars from points on the Hudson Valley Railway into Troy, via Waterford, was entered into on June 7, 1901. Under the terms of this agreement the Hudson Valley Railway furnished at its own expense the men to run its cars over the tracks of the United Traction Company. The Amalgamated Association contends that its contract covers this run and that the cars operated into Troy by the Hudson Valley Railway should be manned by members of the Troy division of the Amalgamated Association.

For the first ten years of the contract between the companies the men operating the cars of the Hudson Valley Railway into Troy over the lines of the United Traction Company belonged to the Amalgamated Association. Subsequently they seceded and joined the Brotherhood of Locomotive Engineers and the Order of Railway Conductors. In its statement the United Traction Company says that as far as it is concerned it feels that these organizations should settle the matter between themselves and should not involve the company or the public. While both the United Traction Company and the Hudson Valley Railway feel that they cannot undertake to settle the differences between the two organizations, they are willing, if it is desirable, to be a party to arbitration proceedings.

INFORMAL TOLEDO CONFERENCE

Henry L. Doherty, chairman of the board of the Toledo Railways & Light Company, Toledo, Ohio, met with a few members of the franchise committee of the Toledo City Council on the afternoon of June 29 and discussed informally a number of points in the new draft for a franchise made by that committee. President Frank Coates and Attorneys Tracy and Rathbun Fuller of the company also were present.

Mr. Doherty and Attorneys Thomas H. Tracy and Rathbun Fuller told the franchise committee that they must refuse to accept the clause in the tentative franchise which provides that the company recognize the initiated municipal ownership ordinance as legal. Mr. Tracy suggested that a clause be inserted saying that the franchise under consideration shall not affect or be affected by the municipal ownership ordinance. Mr. Doherty objected to the clause in the proposed franchise which would require the company, in case the city purchased the property, to accept at least half the bonds issued against the property for the purchase. The bonds would be a lien against the property only and not against the tax duplicate. Mr. Doherty said the company preferred a cash settlement. The committee was informed that the company would insist on a rate of fare that would yield 6 per cent on the investment; a guarantee that it would be reimbursed for any loss during the year's try-out of the 3-cent fare; assurance that the property will be purchased at its appraised value if a franchise is granted any other company, and that it should not be required to begin again if the try-out period is interrupted.

At the conference on June 30 agreements were reached on a number of points, but several others were still in dispute at the close. One of these pertains to the return on the investment during the try-out period, and another is the proportion of bonds the company shall take in case the city purchases the property. Mr. Doherty wanted a stipulation that the company accept one-third of the bonds at a fair market value. Chairman Dotson insisted that they should be taken at par and accrued interest.

Mr. Doherty expressed surprise when informed of the Mayor's assertion some time ago that he would veto any franchise agreement reached by the committee and the company representatives, but Chairman Dotson expressed the belief that Council will approve the franchise under consideration. It was agreed between the parties that the franchise should be submitted to a vote of the people at the primary election on Sept. 14, instead of the regular November election. Mr. Doherty asked the committee to have the tentative draft of the franchise printed, leaving blanks for the portions upon which an agreement has not been reached, and that another conference be held the afternoon of July 2. He desired to reach an agreement on the entire franchise, if possible, before he returned to New York on July 3.

CONTROVERSY IN TORONTO

Toronto Railway and City in Contest for Short Line Desired by the City for Its Civic Railway

At noon on June 29 the Board of Control of Toronto, Ontario, issued instructions to Works Commissioner Harris to tear up the remainder of the tracks of the Toronto & York Radial Railway's Metropolitan division on Yonge Street south of Farnham Avenue, and this has been done. Shortly after the order was issued by the controllers the Toronto Railway opened the legal battle over the franchise question at Osgoode Hall. The company through its solicitors issued a writ against the city "for an injunction to prevent the defendants, the Corporation of the city of Toronto, from removing the tracks on 1320 ft. of Yonge Street south of Farnham Avenue, and for a mandatory order to replace so much of the said tracks as have already been taken up." This injunction is pending.

At the Board of Control meeting Controller Spence opposed the action of the board on the ground that it might prejudice the city's interests before the Ontario Railway Board, when the members consider the railway application for an order to operate. Mayor Church claimed that the alleged sale of tracks by the Metropolitan to the Toronto Railway was not carried out according to the requirements of the railway act.

Mayor Church issued a statement in which he said:

"The franchise has elapsed, and no one can renew it but the people. The sale of the Metropolitan to the Toronto Railway means nothing, as the Metropolitan had nothing to sell after midnight last Friday except the rails and overhead fixtures. The district south of Farnham Avenue to the Canadian Pacific Railway crossing is the most important in Toronto and is the funnel for Sir Adam Beck's radial railways. The 1891 agreement of the Toronto Railway does not give it the right to operate this service, as the Beck act is to be read into the section requiring the vote of the people. The subway at the head of Yonge Street will not be finished for some time. Before the Toronto Railway can operate, it will have to secure an order from the Dominion Railway Board."

The Mayor proposes that the city lay a permanent pavement on the street and a double line of tracks and find a way to link up with the St. Clair Avenue line of the Toronto Civic Railway operated by the city.

The Toronto Railway's answer to the action of the city officials in tearing up the tracks was heard by the Ontario Railway Board on June 29. H. S. Osler, counsel for the company, appealed to the board for an order compelling the city to relay the tracks and affirming the right of the company to give a service over that section. Mr. Osler declared that the work of tearing up the tracks had been continued in contempt of the board after the company had appealed to the board. He held that under its agreement with the city the Toronto Railway had the right to operate upon all streets with the exception of the portion of Yonge Street where the York Radial Railway had a franchise. When the radial company no longer had that right it fell to the Toronto Railway. A remark by the chairman of the railway board that the line was better than nothing and that the city had apparently treated with indifference the efforts of the company to accommodate the public brought a vigorous objection from Mr. Fairty for the city. In reserving judgment Mr. McIntyre of the Railway Board expressed the opinion that some interim arrangements should be made for the convenience of the public.

Amalgamated to Meet in Rochester.—The fourteenth convention of the Amalgamated Association of Street & Electric Railway Employees of America will be held in Rochester, N. Y., in September. The Boston *News Bureau* says that a concerted effort may be made by New England car men at the meeting to have the arbitration clause stricken from their constitution as a result of the Bay State Street Railway arbitration award.

New Stone & Webster Offices in Texas.—A suite of offices in the Scanlan Building at Houston, Tex., has been engaged for the district office of the Stone & Webster Management Association. L. C. Bradley, assistant district manager of the association, will occupy the new quarters with his office force on July 10. Mr. Bradley formerly had supervision over the Dallas properties controlled by Stone & Webster, which work has now been assumed by Charles F. Wallace.

Commissions as Constitutional Bodies.—Representatives of many public utility corporations which are under the jurisdiction of the Public Service Commissions of New York State joined on June 23 in urging a Constitutional Convention committee to make the commissions constitutional bodies. At present they have only legislative authority for their existence. It was urged that the change would add dignity to the commissions, tend to take them out of politics and add force and weight to their rulings.

The Philadelphia Transit Ordinance.—By unanimous vote the Common Council of Philadelphia, Pa., has passed the ordinance authorizing the $6,000,000 transit loan. The finance committee's plan is to have the loan ordinance transmitted to the Mayor as soon as it is concurred in by Select Council. Immediately upon being advised that the ordinance has been approved by Mayor Blankenburg, the finance committee will report the appropriation ordinance, which will be passed by both chambers. The committee proposes to allot $3,000,000 for preliminary work on the Broad Street subway and $3,000,000 to the Frankford Elevated line.

Financial and Corporate

ANNUAL REPORT

Middle West Utilities Company

The comparative statement of income, profit and loss of the Middle West Utilities Company, Chicago, Ill., for the fiscal years ended April 30, 1914 and 1915, follows:

	1915.	1914.
Total income	$1,528,855	$1,466,760
Expenditures	168,855	165,068
Balance	$1,360,000	$1,301,702
Interest	378,684	227,516
Net income	$981,316	$1,074,186
Preferred stock dividend	598,048	566,925
Balance	$383,268	$507,261
Written off	80,000	75,000
Balance	$303,268	$432,261
Due from subsidiary companies	78,504	147,416
Total surplus	$381,772	$579,677

The report shows total income of $1,528,855, comparing with $1,466,760 in the previous year, an increase of $62,095. Interest charges were increased $151,168 and preferred stock dividends were increased $31,123, but in spite of this the company surplus for the year, after all deductions, stood at $303,268.

The report states that owing to the unsettled conditions the increase in gross business of the subsidiary operating companies was not equal to what might have been expected under normal conditions. The combined earnings of the subsidiary companies for the last two fiscal years follow:

	1915.	1914.
Gross earnings	$7,634,745	$7,345,350
Operating expenses	4,877,016	5,036,696
Net	$2,757,729	$2,308,654
Fixed charges (paid outside holders)	$1,307,629	$908,032
Dividends (paid outside holders)	310,428	474,816
Total	$1,618,057	$1,382,848
Earnings accruing to Middle West Utilities Company	$1,139,672	$925,806

Of the foregoing earnings $437,123 come into the company's treasury as interest on bonds and debentures, $269,774 as interest and brokerage on money advanced and $354,270 as dividends on stocks, leaving a balance of $78,504. This is the company's proportion of the surplus carried in the aggregate surplus accounts of the subsidiary companies on their own books.

THE KANSAS CITY REORGANIZATION

At the meeting of the committee of the upper house of the City Council of Kansas City, Mo., to which the ordinance extending the time limit for the acceptance of the street railway franchise was referred, Frank Hagerman, attorney for the receivers of the Metropolitan Street Railway, outlined the history of the negotiations under the terms of the franchise. He suggested that the only hope for agreement lay in the proposal of Judge Hook of the Federal Court to present a plan of reorganization for the adoption of the stockholders and bondholders. Mr. Hagerman had no idea what would happen if the franchise was returned.

The participation of the city in the management of the street railways under the new franchise was indicated at the session by the questions and remarks of Aldermen. Under the court's sanction the receivers have employed P. J. Kealy, suggested by the street railway interests, and Robert P. Woods, suggested by the city, to perform practically the duties which will be performed by the board of control provided for in the new franchise. In response to questions by Aldermen, it was pointed out that these gentlemen are actually performing such duties, especially in reference to schedules and service. Judge Evans urged that since Judge Hood had so plainly indicated his conviction that service to the public was the first consideration of any settlement, the Council should accede to his request for an extension of four months in the time limit for acceptance of the franchise.

The City Council of Kansas City has granted an extension to Nov. 7, four mouths, to the time within which the Kansas City Railways must accept the franchise voted by the city. The action was in response to a request of Judge Hook of the federal court, who said he would prepare a plan for the acceptance or rejection of the interested parties, and would recommend final cancellation of the franchise if this plan was not adopted. The Council has also extended to Nov. 20 the opportunity for the interurbans to accept the conditions of the franchise bearing on a union station.

WASHINGTON MERGER STORY DENIED

In a letter to the ELECTRIC RAILWAY JOURNAL George E. Hamilton, president of the Capital Traction Company, Washington, D. C., asks that a denial be published of the item which appeared in the issue of this paper for June 26, page 1223, to the effect that negotiations were being conducted for the merger of that company with the Washington Railway & Electric Company. Mr. Hamilton says:

"Permit me to state that the Capital Traction Company, its officers and directors, have no knowledge whatever of any such negotiations and that the article referred to is entirely without foundation in fact."

OAKLAND, ANTIOCH & EASTERN FINANCING

The Oakland, Antioch & Eastern Railway, Oakland, Cal., has asked the Railroad Commission of California to approve its new plan of financing. This plan embraces two agreements, one with the bondholders and the other with the stockholders of the company. The agreement between the Oakland, Antioch & Eastern Railway and the bondholders of the Oakland & Antioch Railway and the San Ramon Valley Railway was originally executed on Nov. 19, 1914, and was amended on Jan. 1, 1915. The agreement provides that the bondholders shall deposit with the Union Trust Company, San Francisco, those coupons which will mature in the years 1915, 1916 and 1917. As security for these it is provided that the Oakland, Antioch & Eastern Railway shall deposit with the trustee prior to Jan. 1, 1918, first mortgage bonds in an amount which, at 80 per cent of their face value, will equal the par value of the coupons deposited and unpaid on Jan. 1, 1918. A further provision is made that the Oakland, Antioch & Eastern Railway shall cancel the unsold portion of the note issue authorized by the Railroad Commission on Feb. 3, 1914. The stockholders' agreement, dated Nov. 19, 1914, provides that each subscriber thereto shall pay to the trustee, as a loan to the railway company, the sum of $3 on each share of stock held by him. These payments are to be made according to the following schedule: Jan. 1, 1915, $1 per share; July 1, 1915, $1 per share; Jan. 1, 1916, 50 cents per share, and July 1, 1916, 50 cents per share. As security for those advances the railway agrees to deposit with the trustee its promissory notes in equal amount. These notes are to be secured by first mortgage bonds in the ratio of two to one.

RECEIVERSHIP AVOIDED

By the payment of a portion of two judgments at once and agreeing to pay the remainder on Dec. 24, 1915, the Cincinnati, Dayton & Toledo Traction Company prevented the appointment of a receiver to collect its rental, in the Federal District Court at Cincinnati on June 24. Edna Wilson et al, executors and trustees of George B. Wilson, deceased, and Julius C. Levi and Samuel Leopold, executors of Marks Leopold, Philadelphia, each secured judgment in the Federal Court on Dec. 24, 1914, for $5,479.17, representing the principle and interest on five debenture bonds of the Dayton Traction Company, a subsidiary of the defendant company.

Both plaintiffs had asked for a receiver for the rents, and a temporary restraining order had been issued to prevent either the Ohio Electric Railway, which operates the property under lease, or the Cincinnati, Dayton & Toledo Traction Company from disposing of the property or money belonging to the defendant, except on order of the court, and the hearing was set for June 24. Attorneys, however, informed the court that a settlement had been arranged and asked for a continuance. This was granted. The company is to pay $3,125 on each claim at once and the remainder on Dec. 24, when it receives an installment of rental from the Ohio Electric Railway.

Birmingham Railway, Light & Power Company, Birmingham, Ala.—The July dividends will not be paid on the common and preferred stocks of the Birmingham Railway, Light & Power Company. This decision was reached on account of the general business depression. An initial dividend of 3 per cent was paid on the preferred stock in January, 1902, and 3 per cent has been paid since then to and including December, 1914. In 1903, 3 per cent was paid on the common stock; in 1904 and 1905, 4 per cent; in 1906, 5 per cent; in 1907 and 1908; none; in 1909, 2 per cent; in 1910, 5 per cent; in 1911, 7 per cent; in 1912, 8 per cent, and in 1913 and 1914, 6 per cent.

Chicago (Ill.) Elevated Railways.—The investigation conducted by the Illinois Public Utilities Commission on the complaint of J. B. Hogarth against the Chicago Elevated Railways collateral trust has resulted in the dismissal of the case. The commission found that the collateral trust, against which the complaint was filed, was not a public utility, and that therefore the commission had no jurisdiction in the case. The answer of the company to the alleged violation of the utilities act by the trust was referred to in the ELECTRIC RAILWAY JOURNAL of March 20, page 599.

Cleveland, Painesville & Eastern Railroad, Willoughby, Ohio.—The Public Utilities Commission of Ohio has authorized the Cleveland, Painesville & Eastern Railroad to issue $20,000 of its 5 per cent bonds, to be disposed of at not less than 80, the proceeds to be used to reimburse the income for improvements paid out of the earnings in 1914. The Cleveland, Painesville & Ashtabula Railroad has been authorized to issue $10,000 of bonds on the same basis and for a similar purpose. The latter company is owned by the former.

Empire United Railways, Syracuse, N. Y.—The Public Service Commission for the Second District has authorized the issue of $42,400 of car trust certificates by the Empire United Railways to pay in part for twelve new pay-as-you-enter cars to cost $52,980, the company paying $10,580 in cash. The certificates are placed with the Guaranty Trust Company, New York, N. Y., bear interest at 6 per cent, and mature in three yearly installments from 1916 to 1919.

Kanawha Traction & Electric Company, Parkersburg, W. Va.—The Fidelity Trust Company, Baltimore, Md., as trustee is offering at 98¼ and interest, to yield about 6 per cent, the unsold portion of the authorized issue of $1,100,000 of two-year 5 per cent mortgage gold notes of the Kanawha Traction & Electric Company referred to in the ELECTRIC RAILWAY JOURNAL of June 19, page 1180. The notes are dated June 15, 1915, and are due on June 15, 1917. The interest is payable on June 15 and Dec. 15 in Baltimore. The notes are in the denomination of $1,000 and $500. The Kanawha Traction & Electric Company was incorporated in April, 1915, and on June 7, 1915, absorbed by consolidation the Parkersburg, Marietta & Interurban Railway, which was incorporated in 1902, and purchased the properties of the Parkersburg Gas, Electric Light & Street Railway Company, the Parkersburg Interurban Railway and the Marietta Electric Company and leased the property of the Muskingum Traction Company. There are outstanding $150,000 of first mortgage 5's of 1938 of the Parkersburg Gas, Electric Light & Street Railway, $550,000 of consolidated 5's of 1942 of the Parkersburg, Marietta & Interurban Railway, $150,000 of first mortgage 6 per cent bonds of the Marietta Electric Company due in 1942 and $1,100,000 of two-year 5 per cent notes of the Kanawha Traction & Electric Company due on June 15, 1917. The Kanawha Traction & Electric Company has authorized $1.500,000 of common stock and $1,500,000 of 6 per cent preferred stock, cumulative after July 1, 1916. Of the common stock $1,100,000 has been issued and of the 6 per cent cumulative preferred stock $1,078,500 has been issued.

Lake Erie, Bowling Green & Napoleon Railway, Bowling Green, Ohio.—On June 25 Judge Killits of the Federal District Court at Toledo granted a decree for the sale of the Lake Erie, Bowling Green & Napoleon Railway. The action was taken in the case of the Union Trust Company against the railroad.

Lima & Honeoye Light & Railroad Company, Lima, N. Y.—The Public Service Commission of the Second District of New York has refused to allow the Lima & Honeoye Electric Light & Railroad Company and the Lima-Honeoye Light & Railroad Company to separate their electric light from their railway business, on the ground that this would result in a default under the lease between companies approved by the commission in 1910, to the disadvantage of the public, as the operation of the railroad would be ultimately abandoned because it is unprofitable.

New Orleans Railway & Light Company, New Orleans, La.—E. H. Rollins & Sons, Boston, Mass., are offering at 100 and interest a block of 6 per cent debentures of the New Orleans Railway & Light Company of 1913 due on June 1, 1916.

New York (N. Y.) Railways.—An additional $500,000 of first consolidated mortgage 5 per cent fifty-year bonds of the Broadway & Seventh Avenue Railroad due in 1943 has been listed on the New York Stock Exchange. This makes the total of this issue listed to date $8,150,000. The bonds are issued from escrow to refund the same amount of second mortgage 5's due in 1914.

Northern Ohio Traction & Light Company, Akron, Ohio.—Hayden, Miller & Company, Cleveland, Ohio, are offering at par and interest the unsold portion of $500,000 of 6 per cent secured gold bonds of the Northern Ohio Traction & Light Company of 1915.

Omaha & Council Bluffs Street Railway, Omaha, Neb.—A quarterly dividend of 1 per cent on the $10,000,000 of common stock of the Omaha & Council Bluffs Street Railway has been declared payable on July 1 to holders of record of June 30, contrasting with 1¼ per cent paid quarterly from Jan. 1, 1912, to April 1, 1915.

Public Service Corporation of New Jersey, Newark, N. J.—There has been listed on the Philadelphia Stock Exchange $261,000 of additional general mortgage 5 per cent sinking fund gold bonds of the Public Service Corporation of New Jersey due on Oct. 1, 1959. This makes the total amount listed to date $36,998,000.

Puget Sound Traction, Light & Power Company, Seattle, Wash.—The Puget Sound Traction, Light & Power Company has declared a quarterly dividend of three-fourths of 1 per cent on its preferred stock, payable on July 15 to stock of record of July 2. This is a reduction of three-fourths of 1 per cent from the regular quarterly dividend of 1½ per cent, the dividend paid on April 15 having been at the latter rate.

DIVIDENDS DECLARED

Aurora, Elgin & Chicago Railroad, Wheaton, Ill., quarterly, 1½ per cent, preferred.

Chicago City & Connecting Railways, Chicago, Ill., quarterly, 1½ per cent, preferred participating certificates.

Chicago (Ill.) City Railway, quarterly, 2 per cent.

Columbus, Newark & Zanesville Electric Railway, Cincinnati, Ohio, quarterly, 1½ per cent, preferred.

Elmira Water, Light & Railroad Company, Elmira, N. Y., quarterly, 1¾ per cent, first preferred; quarterly, 1¼ per cent, second preferred; quarterly, 1 per cent, common.

Interstate Railways, Philadelphia, Pa., 30 cents, preferred.

Little Rock Railway & Electric Company, Little Rock, Ark., 3 per cent, preferred; 5 per cent, common.

London (Ont.) Street Railway, 3 per cent.

Manchester Traction, Light & Power Company, Manchester, N. H., quarterly, 2 per cent.

Nashville Railway & Light Company, Nashville, Tenn., quarterly, 1¼ per cent, preferred.

New England Investment & Security Company, Springfield, Mass., 2 per cent, preferred.

Omaha & Council Bluffs Street Railway, Omaha, Neb., quarterly, 1¼ per cent, preferred; quarterly, 1 per cent, common.

Philadelphia Company, Pittsburgh, Pa., quarterly, 1½ per cent, common.

Porto Rico Railways, Ponce, Porto Rico, quarterly, 1¾ per cent, preferred.

Scioto Valley Traction Company, Columbus, Ohio, quarterly, 1¼ per cent, first preferred; quarterly, 1¼ per cent, preferred.

Western Ohio Railway, Lima, Ohio, quarterly, 1¾ per cent, first preferred.

Winnipeg (Man.) Electric Railway, quarterly, 2½ per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
REPUBLIC RAILWAY & LIGHT COMPANY, NEW YORK, N. Y.					
1m., Apr., '15	$237,747	*$149,664	$88,083	$56,808	‡$31,269
1 " " '14	252,461	*152,176	100,285	56,050	‡44,291
4 " " '15	962,584	*606,509	356,075	227,441	‡128,894
4 " " '14	991,579	*618,246	373,333	222,733	‡150,877
INTERBOROUGH RAPID TRANSIT COMPANY, NEW YORK, N. Y.					
1m., May, '15	$2,904,773	*$1,280,115	$1,624,658	$911,861	‡$786,463
1 " " '14	2,948,937	*1,292,504	1,656,433	911,861	‡810,296
11 " " '15	30,744,300	*12,836,463	16,907,837	10,003,551	‡7,470,966
11 " " '14	30,800,728	*13,764,780	17,035,948	10,211,703	‡7,391,442
CITIES SERVICE COMPANY, NEW YORK, N. Y.					
1m., May, '15	$287,365	$14,358	$273,007	$40,833	$232,174
1 " " '14	281,104	8,870	272,234	29,167	243,067
12 " " '15	3,952,800	143,095	3,809,705	478,333	3,331,372
12 " " '14	3,245,045	93,824	3,151,221	268,896	2,882,325
TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.					
1m., May, '15	$789,118	$499,383	$289,735	$137,153	‡$154,937
1 " " '14	806,123	472,114	334,009	133,979	‡200,522
5 " " '15	3,821,110	2,544,657	1,276,453	668,218	‡620,944
5 " " '14	3,722,869	2,388,582	1,334,287	651,183	‡687,454
EL PASO (TEX.) ELECTRC COMPANY					
1m., Apr., '15	$76,698	*$43,293	$33,405	$4,201	$29,204
1 " " '14	81,419	*47,940	33,479	4,522	28,957
12 " " '15	1,016,196	*555,052	461,144	50,350	410,794
12 " " '14	937,340	*513,504	423,836	51,268	‡379,567
PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.					
1m., Apr., '15	$22,193	*$14,866	$7,327	$7,750	†$423
1 " " '14	23,941	*16,677	7,264	7,666	†402
12 " " '15	297,982	*190,135	107,847	91,767	16,080
12 " " '14	308,257	*198,023	110,234	91,302	18,932
PENSACOLA (FLA.) ELECTRIC COMPANY					
1m., Apr., '15	$20,472	*$11,433	$9,039	$7,200	$1,839
1 " " '14	22,323	*14,470	7,853	7,170	683
12 " " '15	253,354	*159,168	94,186	86,982	7,204
12 " " '14	285,373	*180,072	105,301	84,079	20,822
SAVANNAH (GA.) ELECTRIC COMPANY					
1m., Apr., '15	$65,689	*$40,959	$24,730	$23,225	$1,505
1 " " '14	70,841	*47,761	23,080	22,875	205
12 " " '15	829,427	*538,954	290,474	276,816	13,658
12 " " '14	843,082	*559,719	283,363	273,522	9,841
PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.					
1m., Apr., '15	$605,180	*$394,582	$210,598	$181,325	$29,273
1 " " '14	702,770	*427,455	275,315	175,267	100,048
12 " " '15	8,072,022	*4,905,546	3,166,476	2,141,107	1,025,369
12 " " '14	8,726,264	*5,028,377	3,697,887	2,088,304	1,609,583
NORTHERN TEXAS ELECTRIC COMPANY, FORT WORTH, TEX.					
1m., Apr., '15	$123,465	*$79,250	$44,215	$27,215	$17,000
1 " " '14	171,411	*97,861	73,550	29,354	44,196
12 " " '15	1,910,801	*1,077,722	833,079	321,636	511,443
12 " " '14	2,159,227	*1,207,272	951,955	292,732	659,223
JACKSONVILLE (FLA.) TRACTION COMPANY					
1m., Apr., '15	$52,076	*$36,425	$15,651	$16,255	†$604
1 " " '14	62,836	*40,239	22,597	12,734	9,863
12 " " '15	677,608	*459,907	217,701	160,143	57,558
12 " " '14	711,162	*452,308	258,854	151,148	107,706
HOUGHTON COUNTY TRACTION COMPANY, HOUGHTON, MICH.					
1m., Apr., '15	$21,850	*$11,812	$10,038	$5,580	$4,458
1 " " '14	24,344	*15,357	8,987	5,660	3,327
12 " " '15	267,497	*173,886	93,611	66,805	26,806
12 " " '14	290,491	176,943	113,548	67,491	46,057
GALVESTON-HOUSTON ELECTRIC COMPANY, GALVESTON, TEX.					
1m., Apr., '15	$152,211	*$98,241	$53,970	$36,058	$17,912
1 " " '14	196,149	*109,759	86,390	35,669	50,721
12 " " '15	2,283,457	*1,256,641	1,026,816	434,963	591,853
12 " " '14	2,434,215	*1,375,662	1,058,553	432,240	626,313
DALLAS (TEX.) ELECTRIC COMPANY					
1m., Apr., '15	$131,945	*$85,308	$46,637	$33,394	$13,243
1 " " '14	179,086	*106,896	72,190	27,334	44,856
12 " " '15	2,062,880	*1,182,824	880,055	396,994	483,061
12 " " '14	2,270,136	*1,339,920	930,216	312,062	618,154
COLUMBUS (GA.) ELECTRIC COMPANY					
1m., Apr., '15	$56,409	*$25,431	$30,978	$28,791	$2,187
1 " " '14	55,234	*22,660	32,574	24,827	7,747
12 " " '15	691,648	*309,939	382,009	340,043	41,966
12 " " '14	636,108	*281,014	355,094	292,288	‡70,071
CAPE BRETON ELECTRIC COMPANY, SYDNEY, CANADA					
1m., Apr., '15	$25,164	*$15,337	$9,827	$6,449	$3,378
1 " " '14	26,505	*16,695	9,810	6,427	3,383
12 " " '15	342,908	*207,650	135,258	76,146	57,112
12 " " '14	375,098	*210,677	164,421	74,560	89,861
BATON ROUGE (LA.) ELECTRIC COMPANY					
1m., Apr., '15	$14,517	*$8,998	$5,519	$2,146	$3,373
1 " " '14	13,589	*9,256	4,333	2,109	2,224
12 " " '15	181,151	*112,335	68,816	25,070	43,746
12 " " '14	169,899	*110,502	59,397	25,258	34,139

*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

THE JITNEY BUS

Washington Bus Line in Receiver's Hands — Regulatory Ordinances in Philadelphia, Rochester, Flint, Taunton and Newport

H. S. Wilson has been appointed receiver of the Metropolitan Coach Company, Washington, D. C., by Judge Gould of the District Court. It is announced that the company will continue to operate its herdic line in Sixteenth Street N. W., between Pennsylvania Avenue and U Street under the direct supervision and management of Mr. Wilson. Officials of the company consented to the appointment of the receivers to take over its business following the filing of a suit in the District Supreme Court against the company in which it was alleged that James O'Donnell had been unable to collect on a judgment against the company in March, 1915, for the sum of approximately $500.

The Metropolitan Coach Company has had an application pending before the Board of Public Utility Commissioners of the District of Columbia to authorize an issue of $150,000 in bonds. The commission would allow only $118,000 to cover necessary expenditures. In a letter to the Public Utilities Commission. S. Dana Lincoln, president of the company, said in part:

"Referring to your letter of April 14 and with reference to the previously declared attitude of the commission with respect to our application for permission to issue $150,000 of bonds, we must repeat that the position taken by the commission is such as to make it impossible for us to finance our needs and therefore impossible to continue the operation of the Metropolitan Coach Company. As we have heretofore pointed out, the proposed issue of bonds would not, except as to the amount specified for new vehicles and garage, have increased the indebtedness of the company. It would, however, have enabled us to put an existing debt (which was incurred in establishing and equipping the motor vehicle service) in such form that it could have been carried at the same time to the company's improvement plans that were being executed. We have also expressed the opinion that in applying to the case of this company rules formulated with reference to the utilities of a wholly different character the commission takes the position that makes a further attempt to continue operation unprofitable and impossible."

The report of the company to the Public Utilities Commission of Washington for 1913, the latest available, contains the following operating figures: gross receipts, $24,734; operating expenses, $23,654, or 95.63 per cent of gross receipts; interest and taxes, $4,381; loss for the year, $3,301. At the beginning of 1913 the deficit was $119,121, making the deficit at the close of 1913 $122,422. The cost of equipment is given as $22,997, and current assets $1,181. Funded debt at the close of 1913 was $95,600, and current liabilities $26,001. In 1913 the line carried 577,539 passengers paying regular fare, and it carried 243,068 passengers on transfers from the Washington Railway & Electric Company's H Street line.

A measure to regulate the operation of the jitney has been passed by the Common Council of Rochester, N. Y., and is now before the Mayor for signature. Vehicles carrying five passengers are to pay a license fee of $50. Vehicles carrying more than five passengers and not more than ten are to pay a tax fee of $60. Vehicles carrying more than ten passengers are to pay a license fee of $75. The bond required is $3,000 for each car carrying not more than ten passengers and $5,000 for each car carrying more than ten passengers. If an owner operates more than 100 jitneys he may give a blanket bond for $25,000. A number of owners operating more than 500 jitneys may unite in one blanket bond of $50,000. The fare by jitney is to be not more than 5 cents within the city. Jitneys are to be inspected once a month under the direction of the Commissioner of Public Safety, who is also authorized to designate hours and routes of service. The ordinance will not revoke any of the licenses granted previous to its adoption.

The Council of Flint, Mich., has passed an ordinance regulating the jitney, effective on July 15. The measure provides for a license fee ranging from $25 for five-passen-

ger buses upwards and for a bond of $5,000 to $10,000 for buses of five to seven-passenger capacity and of $20,000 for those over ten-passenger capacity. The regular seating capacity of the buses must not be exceeded.

The ordinance committee of the City Council of Richmond, Va., has recommended to the Council for passage an amended ordinance designed to regulate the jitney in that city. The proposed ordinance requires an indemnity bond, fixes certain routes and limits the carrying capacity of the vehicles. The committee after voting down several amendments adopted a motion fixing the bond of the first car at $2,000, and $500 for each additional car. The license fees for cars are fixed according to the route and the number of passengers carried. The minimum license for a four-passenger car is $30 and the maximum license for a nine-passenger car is $75.

A jitney regulatory ordinance has been passed in Taunton, Mass. The measure provides that no vehicles shall be operated for hire in Taunton until a license in the sum of $100 has been obtained and that a bond in the sum of $5,000 shall be taken out for the first vehicle and one of $1,000 for each additional vehicle. The drivers of vehicles licensed under the measure are not to carry in their vehicles any passengers in excess of the designed seating capacity.

The police commissioners of Kansas City have rejected the proposal of the Kansas City Jitney Association that one of their members be made a special officer to help regulate traffic at the downtown jitney station, Twelfth Street and Grand Avenue. The starter of the association said he had been assisting in traffic regulations, and that if he had a commission he could work more effectively. The police board was averse to granting any special interest in transportation any authority over traffic, and the conclusion was that the police would continue to be the official regulators of traffic.

The City Commissioners of Austin, Tex., have passed an ordinance regulating the jitneys, the principal features of which are provision for a license fee of $50 for five-passenger cars, $75 for six-passenger cars and $100 for seven-passenger cars; a bond of $2,500 for the injury of one person in accidents and a bond of $5,000 for the maximum damages which can be demanded by several persons who may be injured in a single accident. School children must be carried for not more than 3 cents when going to or from school. The ordinance prohibits the jitneys from operating on Congress Avenue between Fifth and Ninth Streets.

A jitney ordinance will go into effect at Newport, R. I., on July 5, 1915. The ordinance requires the operator to procure a special annual license from the Board of Aldermen. Six months' residence preceding the date of application is required. The license is fixed at $2 per seat at the manufacturer's rating, with a maximum fee of $50 per bus. The specification of stands is well covered in the ordinance. No license is to be issued until there is filed with the board an amount computed at the rate of $250 per seat, with approved surety, conditioned in substance to pay all damages sustained in the conduct of the business. Violation of the ordinance is punishable by a fine not exceeding $50.

On June 30 City Councils of Philadelphia, Pa., passed an ordinance establishing a 5-cent fare zone which the jitneys must traverse, extending on the north to Olney Avenue and on the south to League Island, with Thirty-third and Diamond Streets as an alternative northern terminus. On baseball days the jitneys may operate to Shibe Park. A license fee of $50 must be paid for each machine and each driver must be bonded in the sum of $2,500. The provision of the ordinance requiring cars to traverse the entire zone system caused a storm of protests from the jitney operators, and it is said that they will petition the mayor to veto the ordinance. On the same day that the regulatory ordinance was passed by Councils the June Grand Jury made its final presentment to Judge Patterson in the Court of Quarter Sessions. The jury recommended fixed regulation of jitneys and held it to be to the city's interest to protect the earnings of the Philadelphia Rapid Transit Company, inasmuch as the municipality is interested financially in that corporation. Dr. Ziegler of the Department of Public Health and Charities of the city has recommended that the drivers be forced to pass a rigid examination before being permitted to run automobiles. He reports that from April 1 to June 12 there were 112 jitney accidents, causing injury to twenty-nine pedestrians and two deaths.

JITNEYS IN THE TEXAS COURTS

Judge Edward R. Meek of the United States Court for the Northern District of Texas, at Dallas, Tex., on June 19, dismissed the bill in the cause of the Forth Worth Auto Association vs. the City of Fort Worth. The judge held that he had no jurisdiction in the matter as there was no federal question involved. From this decision it follows that, in the opinion of Judge Meek, the original jitney ordinance was not a contract and the passage of the amended ordinance, which made the first ordinance inoperative, did not result in confiscation of property and did not violate the fourteenth amendment of the federal constitution.

Before the hearing Judge Meek said that he had grave doubts as to his jurisdiction in the matter, but in order that partiality might not be shown he decided to listen to the argument of the counsel. City Attorney Altman argued that the first ordinance was not a contract but a franchise and that the city had the right absolutely to terminate any license granted under the ordinance and should be permitted to make additional terms under which the jitneys should operate. He denied that any discrimination had been shown or that the men would be unable to make the bond as claimed. At the conclusion of the arguments, Judge Meek requested that the ordinance, which was to have gone into effect on June 17, be suspended until he had time to determine whether a federal question were involved. This suspension was granted by Mayor Tyra. On June 19, Mays & Mays, attorneys for the jitney union, received a brief letter from Judge Meek in which he stated:

"After careful consideration I have reached the conclusion that the United States District Court is without jurisdiction to entertain the application for the injunction."

When informed of the decision, Police Commissioner Hurdleston said:

"The ordinance is now in effect and the police will proceed to enforce it without further instructions."

The jitney attorneys announced that an appeal would be made to the Supreme Court of the United States.

No decision has as yet been handed down by the Fifth Court of Civil Appeals on the hearing of the application for an injunction sought by the jitney union to restrain the enforcement of the jitney ordinance by the city of Dallas, Tex. The case was taken under advisement on June 12. The Court of Appeals remains in session until July 3, and it is expected that a decision will be rendered on June 26. In any case the ordinance, by agreement, will not go into effect until July 15.

Judge Marvin Brown of the Sixty-Seventh District Court at Fort Worth, Tex., declined to release I. W. Sullivan, the jitney driver, on his application for habeas corpus which was heard June 14. Sullivan was found guilty in the County Court of violating the first jitney ordinance and the decision was affirmed by the Court of Criminal Appeals. When the mandate of the Appellate Court was received by the County Court, attorneys for the defendant applied for a writ of habeas corpus on the grounds that the second ordinance had repealed the first and that the defendant should not be punished for violation of an ordinance which no longer existed. After hearing the case Judge Brown decided against the contention of the defendant. The case was promptly appealed to the Court of Criminal Appeals.

A temporary injunction restraining the enforcement of the Fort Worth jitney ordinance has been granted by Judge Marvin H. Brown of the Sixty-seventh District Court on an application filed by the Auto Transit Company, a private corporation chartered for fifty years. Members of the jitney union who have offered resistance to the ordinance in the courts without effect, joined as intervenors with the Auto Transit Company after the injunction suit was filed. The petition holds that both the original ordinance and the amended one are unreasonable, discriminatory, and void and in violation of the Constitution of the United States and of the State of Texas. It is argued that the Northern Texas Traction Company is operating street cars for hire and is not required to pay any license fee or occupation tax, nor is it required to execute any sort of bond. A bond of $500 was required by the court of the plaintiff.

SEATTLE COMPANY TO RUN JITNEYS

According to A. L. Kempster, general manager of the Puget Sound Traction, Light & Power Company, Seattle, Wash., the company will engage in the jitney business in that city. In discussing the plans of the company, Mr. Kempster said:

"Experience is showing us that the public demands faster service. The time for romance and platonic consideration of conditions is past. We will fight fire with fire. If the public demands that we give fast service in small units, with correspondingly few stops, we shall do so. Not only does the jitney cost us less to operate but it gives us a certain amount of freedom from franchise and public service regulation. How soon the new plan will go into effect is problematical, but we are ready to protect our property by giving the public exactly what it wants. As a matter of fact, the saving in our rail upkeep and in the care of overhead wire and in carhouse costs will pay the cost of upkeep and repairs, and go a long way toward the primary cost of such machines as we may be compelled to purchase.

"The problem of whether the public wants motor service is answered by decreased receipts. The company feels that it can go further toward giving reliable service to the public through the jitney bus as a medium than can any individual. It goes without saying that we are responsible. That is a big feature. There cannot be speed without an occasional smash-up. If we are willing to let our claim department settle with real cash for any accident directly attributable to our service, we are doing the riding public a service. Under the present bonding system, a month, two months, three months may elapse before a claim is settled. With us, the presentation of proofs that we are blameworthy is sufficient basis on which to establish negotiations for a cash settlement.

"Great, big motor-propelled cars will never be run by the Puget Sound Traction, Light & Power Company as mediums of transportation. The minute this is done the automobile is put into the class of the street car, with as many stops and consequent loss of time. Neither will the heavy freight business pass to the automobiles. The package-carrying business was dropped by us many months ago, and nothing is left now but the heavy freight and the straight passenger-carrying business. Conditions at present are unusual, 'unordinary,' or remarkable, according to the viewpoint, but the fact remains that if the public demands the automobile, we shall furnish it and it will be a service no citizen need be ashamed to patronize."

At present the electric railway pays Seattle 2 per cent of its gross earnings, but this will not be required of the subsidiary jitney company. The present revenue of $70,000 a year to the city from this source will be reduced materially, and other obligations, including that of building and maintaining street paving, will be removed in a large measure. It is stated that the company's receipts have fallen off about $2,000 a month on account of the jitney, which pays only a vehicle license to the city. The new jitney service of the company will cover only short runs, as it is unnecessary to enter long-haul traffic, which is unprofitable to the street cars and to the jitneys. It is even intimated that the suburban service of the company will be curtailed on account of its unprofitable character.

JITNEY ORDINANCE VALID

An important decision has just been handed down by the Supreme Court of Appeals of West Virginia upholding the rights of cities of that State to regulate the jitney. The city of Huntington had passed an ordinance on the jitney bus with the usual restrictive provisions, requiring among other things from owners of jitneys the filing of a $5,000 bond and a statement from the applicant as to the terminals and routes over which the cars were to operate and the hours of their operation. The case was brought to the Supreme Court on a writ of habeas corpus charging illegality of the ordinance for a violation of which the relator was held in restraint of his liberty.

In its opinion denying this writ the court showed at length that every city in West Virginia had the power to limit and regulate the use of vehicles kept for hire and that it might classify them for purposes of regulation, and an ordinance dealing with one class of such vehicles, as determined by the nature of their business and the prices they charge, is not discriminative because of its lack of provision for the regulation of other distinct classes of vehicles kept for hire. The case was entitled No. 2906 ex parte M. T. Dickey, and it is said to be the first decision by the highest court of any State on the legality of jitney regulation in cities.

THE TENNESSEE JITNEY DECISION

Abstract of Decision Rendered by Circuit Court Judge Holding the State Law Unconstitutional

In a decision holding the Tennessee jitney law to be unconstitutional rendered by Judge A. B. Pittman of the Third Division of the Circuit Court at Memphis and referred to briefly in the ELECTRIC RAILWAY JOURNAL of June 26, page 1225, the court said in part:

"It is not open to debate or doubt that the Legislature may define and declare what constitutes a common carrier; that it may define and declare privileges; that it may classify different privileges for purposes of taxation, and also for other purposes; that municipalities may regulate the use of its streets and impose such reasonable terms and conditions upon the users as it may deem wise. The only restriction under the constitution is that the classifications must be natural and reasonable and not arbitrary and discriminatory.

"The act under examination in this case declares the jitney bus to be a common carrier, and provides among other things that such common carrier shall give a bond conditioned that such carrier will pay any damage that may be adjudged finally against such carrier as compensation for loss of life or injury to person or property inflicted by such carrier or caused by his negligence.

"Passing the question of the right to classify the jitney so as to compel it to protect its passengers, what possible justification is there for classifying it so as to compel it to afford protection to the street-using public in general, when no such burden is placed upon owners of private automobiles? Whatever might be said of the Legislature's power to regulate the jitney as a carrier of passengers and to require bond for the protection of such passengers the law leaves no room for doubt that the Legislature may not impose upon the jitney a burden as to street using pure and simple not imposed on others using the streets in identically the same manner.

"I hold the act in question (being chapter 60 of the acts of 1915) unconstitutional, and void, in that it is class legislation of the most glaring character, is arbitrary and discriminatory, and violative of the constitution of Tennessee. The relator herein will be discharged and the costs of this proceeding taxed against the city of Memphis."

DETROIT PURCHASE ULTIMATUM

The Board of Street Railway Commissioners of Detroit, Mich., has sent an ultimatum to the Detroit United Railway to the effect that unless the company accepts the terms of a purchase contract by July 6 all negotiations for the purchase of the lines of the company within the one-fare zone will be called off. For several weeks attorneys representing the city and the company have been holding conferences with a view to drafting an agreement to provide for submitting the purchase proposition to the electors, the understanding being that the price of the property was to be fixed by the Circuit Court of Wayne County. The Street Railway Commission has issued a statement to the effect that the company has sought to get language into the agreement which would tie the hands of the court and be prejudicial to the interests of the city, and in its ultimatum it gives notice that the company must accept the contract as the city wants it or the commission will "proceed immediately to acquire a railway by other ways and means." The ultimatum came as a surprise, inasmuch as frequent statements have been forthcoming from the commission indicating that the differences between the attorneys were largely with respect to details. The company has not indicated what course it will pursue in dealing with the latest phase of the purchase negotiations, but it is highly improbable that the company will accept any agreement which it does not believe protects its interests properly.

Wages Restored.—The Gulfport & Mississippi Coast Traction Company, Gulfport, Miss., which reduced the wages of its employees last October, has restored them to the former scale.

One-Man Cars in San Antonio.—The City Commissioners of San Antonio, Tex., have granted permission to the San Antonio Traction Company to use one employee on the cars of several of its local lines.

Toilet Facilities Ordered.—The Public Utilities Commission of Kansas has ordered the Joplin & Pittsburg Railway to provide toilet facilities on all of its cars. The order is based upon an act of the Legislature of 1915.

Accident in Brooklyn.—Slippery rails, due to a storm, caused a rear-end collision on the night of June 27 between a Vanderbilt Avenue surface car and a Culver line train, at Neptune Avenue near Van Siclen station, Coney Island, in which fourteen persons were injured.

Fare Increase Suspensions.—The Public Service Commission of Massachusetts has suspended until Aug. 1 the proposed increase in passenger fares and fare limits on the Norfolk & Bristol Street Railway, and proposed increase in fares on the New Bedford & Onset Street Railway.

Traffic Interchange in Illinois.—An interchange of freight has been arranged between the Illinois Traction System, Peoria, and the Kankakee & Urbana Traction Company, Urbana, Ill., intrastate tariffs being effective on June 12 and interstate rates effective on July 10. All shipments are routed via Urbana, Ill.

Traction Lines to Feature the Liberty Bell.—The Fort Wayne & Northern Indiana Traction Company and other interurban lines entering Fort Wayne, Ind., will run excursions into that city on July 6, when the Liberty Bell, en route to the Panama-Pacific Exposition in San Francisco, will be exhibited in Fort Wayne.

High Speed Camden-Newark Service.—Fast through service to New York every hour has been inaugurated by the Public Service Railway from Camden, opposite Philadelphia, by way of Trenton and New Brunswick, to Newark, where connection is made with the Hudson & Manhattan Railroad. The running time is five hours, and the fare is $1.45 for one way, and $2.60 for the round trip.

Seattle Service Case.—Federal Judge Neterer at Seattle, Wash., has signed an order allowing the Puget Sound Traction, Light & Power Company to perfect an appeal to the United States Supreme Court on the order of the State Public Service Commission requiring the company to furnish a seat for every passenger, as well as to run its Alki Point, Fauntleroy Park, and Ballard Beach lines beyond the downtown termini provided by the company's charter.

The Memphis Fare Case.—The case involving the efforts of the city of Memphis, Tenn., to compel the Memphis Street Railway to issue transfers on tickets sold at the rate of eleven for 50 cents, has been argued before the State Supreme Court sitting at Jackson. A writ of mandamus issued by the lower court was taken to the Appellate Court by the railway and went in favor of the company. The city is aggressor in the present review of the case in the highest court of the State.

The St. Louis Skip-Stop Hearing.—Additional testimony was taken before the Public Service Commission of Missouri in St. Louis on Jan. 26 in regard to the petition of the United Railways for permission to eliminate 770 stops in the city. Application has been made to the commission by the company for a rehearing in regard to the order of the commission requiring the company to construct certain extensions and install loops. The requirements of the commission with respect to extensions and loops was referred to in the decision of the commission abstracted in the ELECTRIC RAILWAY JOURNAL of May 15, page 961.

The Free Transportation Menace.—A tentative clause in a franchise for the construction of an extension in Los Angeles, Cal., has resulted in a statement from the Los Angeles Railway Corporation with respect to free transportation. The clause in question sought to extend the courtesy of free transportation on all lines of the company to all nurses of the health department. The company objected to this. S. M. Haskins of counsel for the company said: "The history of free transportation in Los Angeles is written in the ordinances of the city. It began with the Mayor and members of the fire department, and it has been increased gradually until the amount of free transportation furnished by the Los Angeles Railway to the city of Los Angeles amounts to more than $200,000 annually."

Operating Trailers in Washington.—As a result of observations made of the operation of trains of two small open cars of the Capital Traction Company, Washington, D. C., and of records kept by the commission and the company of accidents occurring on these cars, the Public Utilities Commission of the District of Columbia is of the opinion that the operation of the small single truck open cars in trains of two cars each with a single conductor in charge of the train is not a menace to public safety. It has therefore ordered that Section 13 of Order No. 21 of the commission be amended to read as follows: "No trailer car shall be operated for the purpose of carrying passengers unless there be a separate conductor or employee acting as such for each car of the train; provided, that trains of small single-truck open cars not exceeding two cars each may be operated with a single conductor in charge of the train."

The Albany Service Case.—A conference was held at Albany, N. Y., on June 23 between officers of the United Traction Company of that city and the members of the Public Service Commission of the Second District of New York with respect to the order of the commission calling for the purchase of forty cars, each with a minimum seating capacity of forty passengers. Chairman Van Santvoord said that the commission felt that conditions were correctly set forth in the data the commission already had, and that the order of the commission must be complied with or the company, in accordance with the decision of the Appelate Division of the Supreme Court, must show that it cannot comply with it. It was finally agreed that the company should submit to the commission not later than July 6 an alternative plan for improving the equipment. This plan may involve either the purchase of new cars or the rebuilding of the old ones, provided this can be done in a satisfactory manner.

The Shore Line Wage Agreement. — As stated in the ELECTRIC RAILWAY JOURNAL of June 26, page 1226, the Shore Line Electric Railway, Norwich, Conn., has agreed with its trainmen to an advance of wages from a minimum of 22 cents and a maximum of 28½ cents an hour to a minimum of 23 cents and a maximum of 29 cents an hour. While it is a fact that the company has increased its wage rates practically one-half cent in each grade, it has at the same time eliminated the overtime payment of 10 cents an hour and the lunch checks. The original purpose of the lunch checks was to protect the men who were detained from their homes or regular eating places, and as a consequence were put to an expense. Under the former agreement the men twice a year elected whether they would take box lunches or 25 cents. For the past year the company has not been asked for a lunch box, and the management felt that it would be fairer to all the men if the money represented by the lunch boxes was distributed among all the men rather than to a favored few. The change in the rate of pay, as frankly stated to the men, will not add materially to the cost of operation of the company, as the increase is very largely offset by the saving which results from the changes previously mentioned.

The Value of Action.—A preachment to railway men that carries a valuable lesson was contained, no doubt unconsciously but none the less effectively, in an item published recently in Louisville. Around it could be woven a second "Message to Garcia." It illustrates strikingly the value of independent action. On account of the lesson which it contains the Louisville (Ky.) Railway is calling the attention of its trainmen to the item, which follows: ". . . On Main Street, between Fifth and Sixth Streets (a busy section of the street, traversed by cars of five important lines, three of which loop there), a wheel came off a wagon and blocked the line. In a very few minutes several cars were tied up by the blockade. One man called the wreck car and then they all stood around trying to talk that wheel back on the wagon. Then something happened —a man came along who could see things. He asked the

driver to take out the wagon tongue, which they used as a pry pole, chocked the wheels with a brick, and raised the axle slightly and put the rim of the wheel under it; got a new bight, raised it again, and put the hub under it, then with another effort the wheel was on and the blockade relieved in just two minutes after the 'live wire' got there. The wreck car found a clear track."

Question of Authority in Canada.—The First Appellate Court at Toronto, Ont., has granted the petition of the Hamilton, Grimsby & Beamsville Electric Railway, Hamilton, Ont., for an appeal against the decision of the Ontario Railway Board made some time ago to compel the company to place certain conveniences in the cars and stations, also on the question as to whether the Dominion of Canada, once having declared a railway for the general advantage of Canada, can subsequently withdraw that declaration. The company claimed that it was outside the jurisdiction of the Ontario Board to require the company to install the conveniences, and that under a section of the railway act of 1888 the railway was placed under the Dominion Railway Board, which alone could exercise authority over it. Counsel for the company pointed out that the dominion by the railway act of 1888 declared all railways crossed by the Grand Trunk and the Canadian Pacific Railways to be works for the general advantage of Canada. By an enactment of 1903, which counsel for the compny challenges as *ultra vires*, the dominion purported to limit this declaration to the crossings only. For twenty years his clients had considered themselves under the Dominican Railway Board, and still did so. The question will be argued later on appeal.

Lexington Arbitration Award.—The board of arbitration which has been handling the case of Motorman Robert E. Walker, discharged last summer by the Kentucky Traction & Terminal Company, Lexington, Ky., has reported, reinstating the motorman and awarding him $200 of back pay. The proposition was referred to the board as a means of compromising the strike which followed Walker's discharge. The union men in the company's employ contended that Walker was dismissed through discrimination against the union. The company urged that the dismissal was purely for carelessness, which resulted in the wreck of an interurban car. C. C. Bagby, a Danville attorney, was named umpire, the union chose its president, Robert Goss, and the company its own superintendent, George McLeod. The decision was a majority finding, holding that the company acted in part from "unconscious prejudice" and that the case did not merit such severe treatment. Supplemental charges that the company discriminated against union employees were dismissed by the board of arbitration as not sustained by the evidence. The minority report, by Mr. McLeod, pointed out that Walker had been dismissed in good faith, "the opinion of the umpire to the contrary notwithstanding," and that he would be reinstated in equally good faith.

Peninsula Railway Fare Case.—F. E. Chapin, general manager of the Peninsula Railway, San José, Cal., has issued a statement in regard to the recent fare decision of the Railroad Commission of California, referred to in the ELECTRIC RAILWAY JOURNAL of May 8 on page 911. Mr. Chapin said in part: "The published reports in relation to the decision of the State Railroad Commission as to the complaint of Palo Alto and Mayfield complaining of discrimination in favor of San José, have been in error and have led to much confusion in the minds of our patrons. Briefly, the decision of the commission is, first, that night excursion rates, which have been so lightly availed of by the traveling public, can be withdrawn by the Peninsular Railway; second, that the Sunday excursion rate from Mayfield and Palo Alto to Congress Springs cannot be raised without discrimination in favor of San José, as it is now; third, that after allowing for the influence of 5-cent street railway fares which ordinarily should not influence interurban fares, but which sometimes cannot be avoided, discrimination in favor of San José against Palo Alto and sometimes in favor of Los Gatos as against Palo Alto, is found, and exists to an extent that demands the revision of existing rates. The present tariffs, which have developed just as the road has grown are being revised accordingly, but it should be apparent to all that the decision does not in itself direct reduction in rates."

Personal Mention

Mr. R. H. Smith, formerly engineer of the Ogden, Logan & Idaho Railway, Ogden, Utah, has been appointed manager of the Goldsboro (N. C.) Electric Railway.

Mr. John H. Adams, formerly chief engineer of the Augusta-Aiken Railway & Electric Corporation, Augusta, Ga., has been appointed general manager of the Blue Ridge Light & Power Company, Staunton, Va.

Mr. Timothy E. Byrnes, formerly vice-president of the New York, New Haven & Hartford Railroad, has established himself in Boston in his former business as legal adviser concerning railroad rates and transportation.

Mr. John W. Wagner president of the German-American Bank, Kansas City, Mo., and not Mr. John W. Brown, as previously reported, has been reappointed as a member of the board of the Kansas City Railways to represent the city.

Mr. R. B. Stichter, vice-president of the Southern Traction Company, Dallas, Tex., has been granted a six months' leave of absence. Mr. Stichter will leave at once for Colorado and expects to spend the greater part of his vacation in the mountain resorts of that State.

Mr. R. F. Blanchard has resigned as chief engineer of the power station of the Holyoke (Mass.) Street Railway to become associated with Mr. William Butler, formerly construction engineer of the Economy Fuel Company, Matteawan, N. Y., in the firm of Blanchard & Butler, Boston, Mass., dealers in engineers' supplies. The employees of the Holyoke Street Railway presented Mr. Blanchard with a traveling bag and toilet set as a token of esteem. He has been connected with the company for more than five years.

Mr. John J. Dempsey, who was elected president of the New York Electric Railway Association at the meeting at Manhattan Beach on June 29 and 30, is superintendent of transportation of the New York Consolidated Railroad (Brooklyn Rapid Transit System). Mr. Dempsey started his railroad career as a boy with the Lehigh Valley Railroad. In 1894 he severed his connection as telegraph operator with that company to take a position as telegraph operator with the Brooklyn (N. Y.) Union Elevated Railroad. He remained with this company until June, 1897, when he resigned to return to the Lehigh Valley Railroad as telegraph operator, from from which position he was promoted to yardmaster. In 1900 he left the Lehigh Valley Road and re-entered the employ of the Brooklyn Rapid Transit Company as assistant dispatcher, from which position he was successively advanced to dispatcher, trainmaster, chief dispatcher, assistant superintendent and finally superintendent of transportation.

J. J. DEMPSEY

Mr. W. S. Stanton, the newly-elected secretary-treasurer of the New York Electric Railway Association, is exceptionally well qualified for the responsibilities of his office, as during the past few years he has been secretary to two of the presidents of the association, Messrs. Peck and Hamilton. Mr. Stanton was born in 1882, and his railway experience began eleven years ago when he entered the service of the Schenectady Railway. He has remained with that system without interruption since that time, being engaged in various positions in the clerical department of the company. For the past eight years he has held the title of secretary to the general manager, Schenectady Railway, and he will retain that position in addition to his secretaryship of the New York associations, as his central location and familiarity with association affairs will enable him readily to combine the duties of both.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

FRANCHISES

New Britain, Conn.—The Connecticut Company has asked the Council for a franchise to extend its lines from Main Street to Myrtle Street, Grove Street, Broad Street, Washington Street, Farmington Avenue, and Commonwealth Avenue to a point 100 ft. beyond Farmington Avenue, New Britain.

***Lakeland, Fla.**—Application is being made to the Council for a franchise to construct a line in Lakeland in connection with a railway to extend to and through surrounding towns, providing a similar franchise is obtained through and along the principal business and residence thoroughfares. A committee of the Chamber of Commerce is working out the details and has been assured of the necessary capital as soon as the franchises and rights-of-way have been secured. Among those interested are G. C. Rogan, M. F. Hetherington, Dr. S. F. Smith, W. F. Sneed, and A. J. Holworthy.

Newport, Ky.—Bids will be received until Aug. 2 by the City Commissioner of Newport for an electric railway franchise. August Helmbold, Mayor.

Springfield, Mass.—The Springfield Street Railway has asked the Council for a franchise to construct a line along Page Boulevard to East Street in Chicopee.

Woburn, Mass.—The Bay State Street Railway has asked the Council for a franchise to alter and relocate its tracks on Washington Street, Woburn.

Farrell, Pa.—The Farrell & Mercer Railway has received a franchise from the Council to construct an electric line in Mercer. This is part of a plan to build an electric railway from Farrell to Mercer and New Castle.

Lynchburg, Va.—The Lynchburg Traction & Light Company has received from the Council a franchise to extend its line from the Fair Grounds to Fort Hill. Work will be begun at once on the extension.

TRACK AND ROADWAY

Fresno (Cal.) Interurban Railway.—Construction of the overhead work has been begun by this company on its line on Belmont Avenue from Fresno Avenue to Valeria Avenue, extending on Valeria Avenue to Merced Avenue and thence to J Street.

Pacific Electric Railway, Los Angeles, Cal.—Plans for the construction of four viaducts to span Macy Street, First Street, Fourth Street and Seventh Street to eliminate the dangerous grade crossings are being prepared by the Board of Public Utilities for presentation to the Council. The plans tentatively worked out by the Board of Public Utilities provide that the cost shall be borne one-half by the steam roads and one-half by the city, the county and the Pacific Electric Railway. The total cost of the four viaducts will be $3,500,000.

San Diego, Cal.—Lewis R. Kirby reports that, owing to the failure of the El Centro trustees to concede a satisfactory route and conditions of operation for the proposed electric railway between El Centro and Imperial, and because of general business conditions, the plan of constructing the railway has been abandoned, at least temporarily. [May 2, '14.]

Municipal Railways, San Francisco, Cal.—The Mission Promotion Association has asked the Board of Supervisors to extend some of its lines in San Francisco. The line which the association urges most strongly is the extension of the Potrero Avenue branch from Tenth Street and Potrero Avenue along Division Street and thence to the Southern Pacific station at Third Street and Townsend Street. From this point the extension would continue to the Pacific Mail docks and to the waterfront.

Mount Carmel Railway, Hamden, Conn.—Willis M. Cook advises that the project to build an electric line from the terminal of the Connecticut Company's line to the top of Mount Carmel has been abandoned. [Oct. 4, '13.]

***Pocatello, Idaho.**—Plans are being considered to build an electric railway from Arbon, Oneida County, to Pocatello. George Williams, Mayor of Pocatello, is interested.

Peoria, Ill.—The immediate construction of the interurban line between Chillicothe and Peoria, which has been in the course of negotiation for some time, was assured at a meeting of the stockholders held in Chillicothe on June 15, at which the engineers who have been making the preliminary survey were present. From the end of the tracks of the Peoria Railway at Riverview Park to the Santa Fé station in North Chillicothe will require the construction of 15.26 miles of track, which, together with the necessary poles, wires, power house and stations, will cost approximately $500,000. E. F. Hunter, Peoria, is interested. [Dec. 25, '14.]

St. Joseph Valley Traction Company, Elkhart, Ind.—In connection with the paving of East Jackson Street this company plans to replace its present tracks, turnouts and switches with new material. The track will be relaid with new open-hearth steel rails not less than 60 ft. long and weighing not less than 90 lb. to the yard. The ties will be 6 in. x 8 in. and 7 ft. long.

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.—Citizens of Newcastle have filed a petition with this company asking that the company extend its city lines in Newcastle.

Southwestern Interurban Railway, Coffeyville, Kan.—Plans are being considered by this company to extend its line from Winfield to the Albright Gardens near Oxford, extending north through Mulvane to Wichita, where it will connect with other interurban lines. It is proposed to construct a line from Wellington to Mulvane to connect with the main line.

Bangor (Me.) Railway & Electric Company.—Work has been begun by this company double-tracking its lines on Harlow Street, Central Street and State Street, Bangor.

Bay State Street Railway, Boston, Mass.—Work will soon be begun by this company extending its double tracks from the corner of Hampshire Street and High Street to Railroad Square, Lawrence.

Springfield (Mass.) Street Railway.—Extensive repairs have been begun by this company in Springfield. The company will retie the entire stretch of track on Walnut Street from King Street to Hancock Street. The track will also be repaired at Memorial Triangle and in the Winchester Park section of State Street from Catharine Street to the New England crossing. The present rails will be replaced on Main Street on the west side of the north-end green. The company is also at work on Elm Street between Park Street and Westfield Street, West Springfield, where 60-lb. rails will be replaced by 80-lb. rails and the same procedure will be followed at Tubb's Hill on Westfield Street. The 7-in. rails on the Sumner Avenue line between the carhouse and the crossing will be removed and replaced by heavier rails.

Worcester (Mass.) Consolidated Street Railway.—Work has been begun by this company laying new rails on West Boylston Street, Worcester, between Chadwick Square and the fair grounds.

Gulfport & Mississippi Coast Traction Company, Gulfport, Miss.—Among the improvements being made by this company is the rebuilding of all bridges on its line from Biloxi and Pass Christian and the replacement of all defective poles.

Metropolitan Street Railway, Kansas City, Mo.—Plans are about completed for the single-deck viaduct and bridge to replace the Central Avenue double-deck structure over the Kaw River. At present the elevated structure of the Metropolitan Street Railway connects with the second deck of the Central Avenue bridge. The roadway on the lower deck extends on the ground level several hundred feet and connects with a viaduct that reaches the higher street level at the bluffs of Riverview. The new viaduct will be a single deck and will be about the present level of the upper deck. There will be viaduct approaches connecting with the roadway viaduct and approaches to the lower level roadway of the east side of the Kaw River. The total cost of the bridge and viaduct will be $450,000.

United Railways, St. Louis, Mo.—This company has received permission from the Board of Public Service to lay double tracks across the new Jefferson Avenue Viaduct, St. Louis.

Lincoln (Neb.) Traction Company.—This company has received permission from the Council to tear up its N Street line and relay the track on K Street, Lincoln. The company will begin work on the K Street line at once, and will maintain service on N Street until the new line is ready to carry traffic.

Brooklyn (N. Y.) Rapid Transit Company.—Bids are desired by the Public Service Commission for the First District of New York for furnishing approximately 37,800 tons of open-hearth track rails and about 2400 tons of open-hearth guard rails for equipping the new lines of the dual system.

Brooklyn (N. Y.) Rapid Transit Company.—The Public Service Commission for the First District of New York will open bids on July 20 for the construction of Section No. 1 of Route No. 49, a part of the Culver line. This a three-track elevated railroad, which will connect the Fourth Avenue subway through Thirty-eighth Street and Gravesend Avenue with Coney Island. Section No. 1 extends from a point in Thirty-seventh Street 246 ft. southeast of Tenth Avenue under private property and intersecting streets to Gravesend Avenue and over Gravesend Avenue to a point about 525 ft. south of Bay Parkway (Twenty-second Avenue).

International Railway, Buffalo, N. Y.—This company is rebuilding its Niagara Street line from Forest Avenue to Hertel Avenue with a concrete roadbed and heavier rails. The East Utica Street line is also being rebuilt on Kensington Avenue from the Erie tracks to Bailey Avenue.

Interborough Rapid Transit Company, New York, N. Y.—This company has received permission from the War Department to construct a bridge over the Bronx River at Westchester Avenue. The bridge will carry the tracks of the Pelham Bay Park branch of the Lexington Avenue subway, which at this point runs on an elevated structure. A permanent bridge will be built with a clearance of 61 ft. above mean high water.

Poughkeepsie City & Wappingers Falls Electric Railway, Poughkeepsie, N. Y.—This company plans to spend about $150,000 for improvements, including the reconstruction of track and extension of double track.

New York State Railways, Rochester, N. Y.—This company has been asked to double track its line on North Street, Rochester.

Western Ohio Railroad, Lima, Ohio.—Plans are being considered by this company to extend its line from St. Mary's south to Covington, via Minster and Fort Laramie.

Toledo, Bowling Green & Southern Traction Company, Toledo, Ohio.—Plans are being considered by this company to extend its line from Findlay to Kenton.

Toronto, Ont.—The Ontario Hydro-Electric Power Commission has completed surveys for the construction of the proposed railway from Toronto to Montreal and Ottawa. Plans have also been prepared for the construction of a radial railway to extend 60 miles north and west of London, Ontario.

Lehigh Valley Transit Company, Allentown, Pa.—It is reported that this company will begin work in the fall on a new route through Center Valley on its Philadelphia division. It is proposed to remove the tracks to private right-of-way for about 2 miles.

Easton & Washington Traction Company, Easton, Pa.—This company plans to construct a line between Washington and Hackettstown, N. J., extending along Lake Hopatcong, 19 miles.

McConnellsburg & Fort Loudon Railway, McConnellsburg, Pa.—Bennett & Randall, contractors, plan to begin work at once on this company's line from McConnellsburg to Fort Loudon, 10 miles. [May 8, '15.]

Scranton & Binghamton Traction Company, Scranton, Pa.—During the year this company plans to spend about $1,000,000 in building a 20-mile extension of its line, and 3000 tons of rail will soon be delivered for use in the construction of the line.

Nashville, Springfield & Northern Railroad, Nashville, Tenn.—Surveys will soon be begun by this company on its proposed line between Nashville, Springfield, Clarksville, Tenn., and Franklin, Ky. [June 19, '15.]

Virginia Railway & Power Company, Norfolk, Va.—This company reports that it has made about $25,000 worth of improvements at Ocean View in the way of new amusement devices and remodeling the hotel. An entirely new bulkhead has also been constructed.

***Wheeling, W. Va.**—Plans are being contemplated to construct an electric railway from Wheeling, W. Va., to Baltimore, Md., via Fairmont and Grafton. Preliminary surveys will be made at once. The Pennsylvania Electric & Lighting Company, Valley Falls, is interested.

SHOPS AND BUILDINGS

Arkansas Valley Interurban Railway, Wichita, Kan.—This company has purchased a site 66 ft. x 66 ft. at 111 Second Avenue East, Hutchinson, where its new terminal station will be erected. It is planned to construct a wye into the station off Second Avenue. The cost of the property was $6,850.

Lewiston, Augusta & Waterville Street Railway, Lewiston, Me.—This company has completed its freight station at Lincoln Street, Lewiston.

New York Municipal Railway Corporation, Brooklyn, N. Y.—Contracts for the construction of eight elevated railroad stations in connection with the third-tracking of the Broadway elevated railroad in Brooklyn, submitted by the New York Municipal Railway Corporation, have been approved by the Public Service Commission for the First District of New York. The proposed stations are at Hewes Street, Lorimer Street, Flushing Avenue, Myrtle Avenue and Broadway, Kosciusko Street, Gates Avenue, Halsey Street and Chauncey Street.

Salt Lake & Ogden Railway, Salt Lake City, Utah.—Pending the construction of a new terminal station, the depot offices of this company, with the exception of the freight department, have been removed to the temporary terminal at Third South Street and First West Street, Salt Lake City, which will be used jointly with the Salt Lake & Utah Railroad. Passenger train service was inaugurated on June 19.

POWER HOUSES AND SUBSTATIONS

Metropolitan Street Railway, Kansas City, Mo.—This company has ordered one 3000-kw., 575-volt d. c., six-phase, twenty-five-cycle, 250-r.p.m. compound-wound commutating pole rotary converter; three 1000-kva., single-phase, twenty-five-cycle, 6600-volt high-tension to rotary voltage low-tension air-blast transformers; one blower outfit for the above transformers and three-panel switchboard for the control of same. The contract for this apparatus has been placed with the Westinghouse Electric & Manufacturing Company.

Ephrata & Lebanon Traction Company, Mauch Chunk, Pa.—This company reports that it has completed and placed in operation its two substations at Iona and Clay in connection with its change from storage battery to overhead operation.

Ogden, Logan & Idaho Railway, Ogden, Utah.—Two substations will be built by this company, one at the Utah Hot Springs and the other at Deweyville, to care for the distribution of power for the entire system between Ogden and Preston. Each station will cost about $35,000, including equipment.

Kanawha Traction & Electric Company, Parkersburg, W. Va.—Preliminary work has been begun by this company for the construction of a power plant at Parkersburg, 140 ft. x 90 ft. The structure will be of brick and concrete. The condensers will be placed in a pit and the turbines will be installed on the floor immediately above. The cost is estimated at $500,000. Sanderson & Porter, engineers.

Wheeling (W. Va.) Traction Company.—This company will discontinue the operation of its power plant at Benwood, but will hold the plant in readiness for emergency service. The new main power plant located at Forty-second Street, Wheeling, has been completed.

Manufactures and Supplies

ROLLING STOCK

New York & Queens County Railway, New York, N. Y., expects to order immediately six double-truck end-entrance cars.

Carolina, Greeneville & Northern Railway, Greeneville, Tenn., a new line, is preparing specifications for rolling stock. F. A. H. Kelley, Greeneville, is chief engineer.

Isthmian Canal Commission, Major F. C. Boggs, general purchasing officer, will receive sealed proposals until Aug. 16 for twelve electric towing locomotives for canal locks.

Hutchinson (Kan.) Interurban Railway has purchased a Westinghouse 323-A motor equipment for one new steel semi-convertible passenger car mounted on Dupont single-trucks.

Corpus Christi Railway & Light Company, Corpus Christi, Tex., has ordered, through A. W. Burke, Wilmington, Del., eight steel single-track one-man cars from the Southern Car Company.

Ogden, Logan & Idaho Railway, Ogden, Utah, reported in the ELECTRIC RAILWAY JOURNAL of June 26 as having ordered six trailers, has awarded this contract to the American Car & Foundry Company. The cars are all-steel and 65 ft. in length.

Eastern Pennsylvania Railways, Pottsville, Pa., is having built by The J. G. Brill Company one all-steel car to be equipped with GE-90 four-motor equipments. The car is designed for experimental operation in both city and interurban service.

TRADE NOTES

Frank R. Farnham has joined the staff of Walter B. Snow, publicity engineer and advertising agent, Boston, Mass. Mr. Farnham was at one time with the McGraw Publishing Company.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has received an order for one 6-kw. combination trolley and storage battery gathering locomotive equipped with two No. 904 motors and Nonclad Exide batteries.

Curtain Supply Company, Chicago, Ill., has received orders for Ring No. 48 fixtures and Rex rollers for the ten cars recently ordered by the Wilkes-Barre & Hazleton Railway, Hazleton, Pa., the ten cars ordered by the Lehigh Traction Company, Hazleton, Pa., and also from the Long Island Railroad and Miami (Fla.) Traction Company.

Standard Underground Cable Company, Pittsburgh, Pa., has been awarded a gold medal by the international jury of award, Panama-Pacific International Exposition, for its exhibit of a complete line of electric wires, cables and cable accessories. This is the seventh award of this degree which has been received by this company in as many different expositions.

Western Electric Company, New York, N. Y., has been awarded the following medals by the international jury of award of the Panama-Pacific International Exposition: The Grand Prix for the exhibit as a whole; gold medals, one for telephone switchboards and equipment, another for telephone train dispatching and control apparatus, and a third for insulated wires and cables.

Esterline Company, Indianapolis, Ind., manufacturer of "Golden Glow" headlights, reports a change in the territory of its Southeastern representation. The Walker-Smith Company of Baltimore will now handle the sale of "Golden Glow" headlights in Delaware, Maryland, Virginia and District of Columbia only. New representatives will be appointed for the States of North Carolina, South Carolina, Alabama, Georgia and Florida.

Dayton Fare Recorder Company, Dayton, Ohio, received orders from the Louisville & Interurban Railroad, Louisville, Ky., and the Cleveland & Eastern Traction Company, Cleveland, Ohio, for large installments of its new interurban fare recorders, following sixty-day trials of the recorders in service. This manufacturing company has also recently secured contracts for recorder equipments from the Pearson Engineering Corporation for one of its South American customers; the Erie Railroad, New York & Long Island Traction Company, Pittsburgh Railways, and United Traction Company, Albany, N. Y. The Dayton company is now arranging to install recorders for trial for the Minneapolis & St. Paul Suburban Railroad and the Jamestown, Westfield & Northwestern Railroad, Jamestown, N. Y.

ADVERTISING LITERATURE

Dayton Fare Recorder Company, Dayton, Ohio, has issued a folder describing its various types of fare boxes. Inclosed with the folder is a photographic reproduction of a record card produced on this company's fare box recorder.

Railway & Industrial Engineering Company, Pittsburgh, Pa., has issued a catalog showing the application of Burke horn gap apparatus in connection with a few of its stationary designs of outdoor substations. Views and diagrams in the catalog show these installations as applied to the Wheeling Electric Company, Virginia-Western Power Company, Ohio Electric Railway, Steubenville & East Liverpool Railway & Light Company, Wilmington & Philadelphia Traction Company, Georgia Railway & Power Company, Central Illinois Public Utilities Company.

National Tube Company, Pittsburgh, Pa., has just issued a de luxe catalog of the material manufactured at the Kewanee works of the company. It is entitled "Catalog J" and contains 450 pages, printed in two, and in some places three, colors. An idea of the completeness of the book may be derived from the fact that the index embraces approximately 1800 entries. This material includes "National" pipe for steam, gas, water, and air; cast-iron, malleable-iron, and brass fittings; "Kewanee" unions and "Kewanee" specialties; brass and iron body valves, cocks, etc.

General Electric Company, Schenectady, N. Y., has issued Bulletin No. 47,050, describing this company's line of small plant switchboards made up of standard units in various combinations. The line provides for a great variety of conditions in small plants where panels of simple and inexpensive design are required. They are designed for 125-volt and 250-volt, d. c., two-wire service, for general power and lighting purposes. These units are described and illustrated in detail, various combinations are illustrated, dimensions are given, and panels designated by catalog numbers. The publication contains wiring diagrams and a list of accessories.

United States Steel Corporation, New York, N. Y., has issued in pamphlet form an extended description of its exhibit and those of its subsidiary companies at the Panama-Pacific Exposition at San Francisco. The pamphlet contains a number of illustrations showing the most interesting apparatus shown. Among the exhibits which will attract particular interest of electric railway men are rail sections, special work and electrically-welded joints of the Lorain Steel Company, rolled steel and forged steel wheels, heat-treated axles and steel ties of the Carnegie Steel Company, trolley poles and other tubing and pipes of the National Tube Company, and rail bonds, insulated wire and fencing of the American Steel & Wire Company. Some interesting statistics of the history, output and organization of the United States Steel Corporation are also given in the pamphlet.

NEW PUBLICATION

Shall the Government Own and Operate the Railroads, Telegraph and Telephone Systems? The Negative Side, published by the National Civic Federation, 1 Madison Avenue, New York. Paper, 119 pages; price, 50 cents.

In this pamphlet are contained the papers presented on the negative side of municipal and government ownership of public utilities at the meeting of the National Civic Federation in New York, Dec. 4, 1914. The authors are Prof. Jeremiah W. Jenks, Ex-Senator Jonathan Bourne, Jr., F. G. R. Gordon, and James W. Sullivan. A report of this meeting and abstracts of the papers were published in the ELECTRIC RAILWAY JOURNAL at the time, but the complete papers should be helpful to all who are interested in this very live subject. The extended experience of all the authors enables them to speak with authority and to marshal facts which are convincing.

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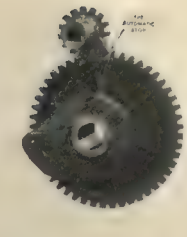

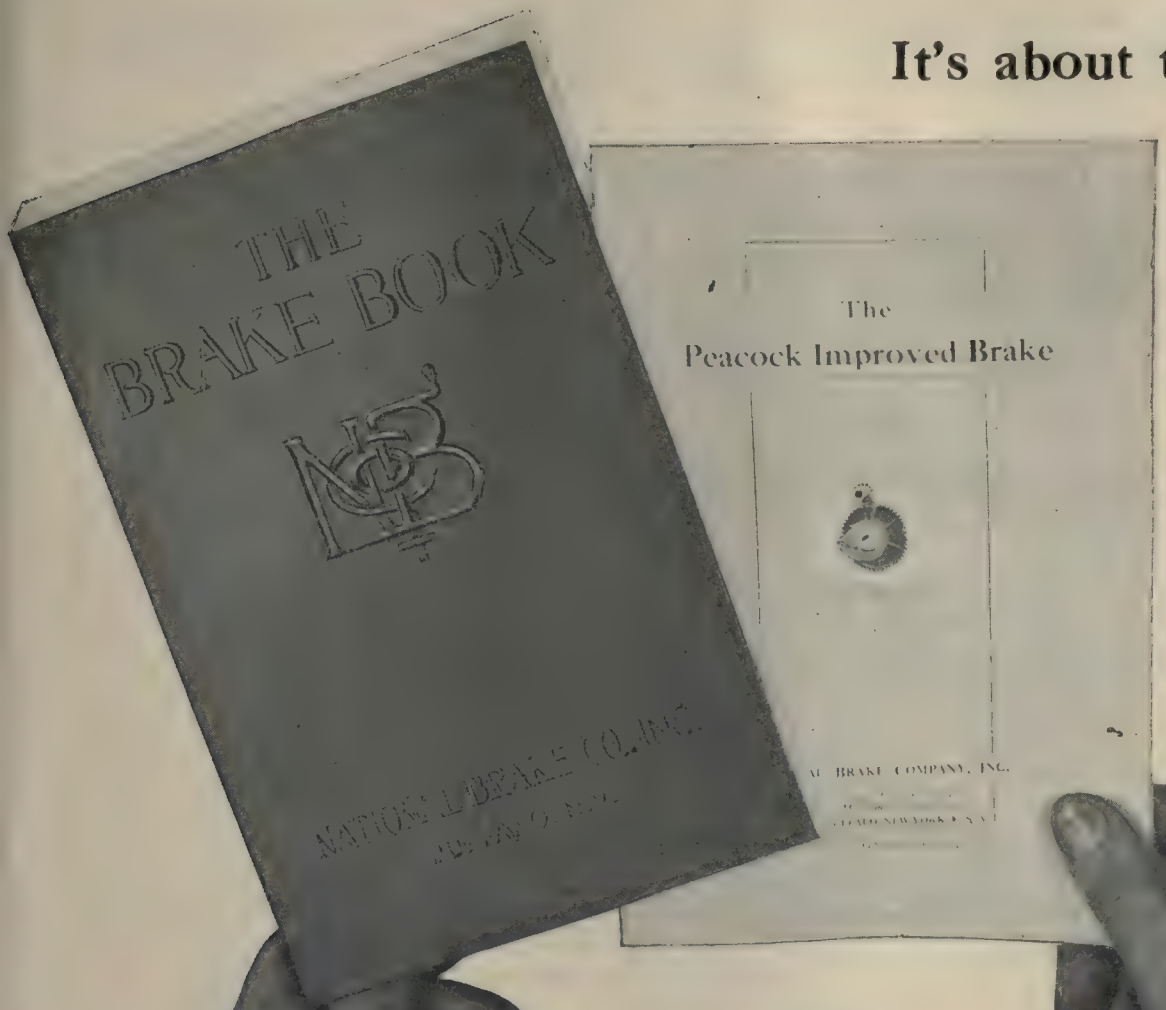

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American Electrical Works

NEW YORK: 165 Broadway
CHICAGO: 112 West Adams Street
BOSTON: 176 Federal Street

Phillipsdale, R. I.

CINCINNATI: Traction Building
SAN FRANCISCO: 612 Howard Street
SEATTLE: 1002 First Avenue South

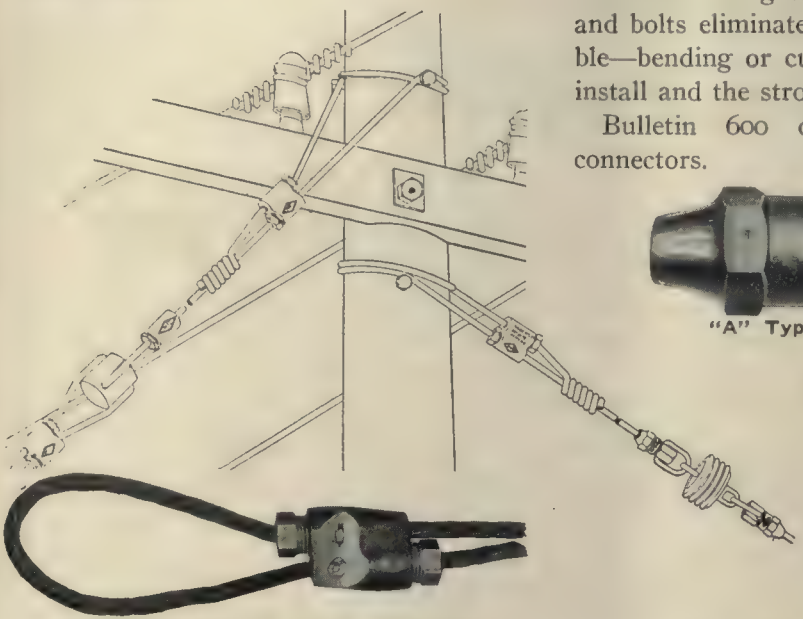
3105

EXCELLENCE
MFC
RELIABILITY

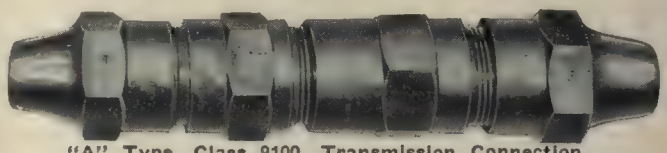
Examine this New Cable Grip

The F. M. C. Cable Grip or Guy Clamp is the most compact and has the longest life of any clamping device. Set screws and bolts eliminated. Slack can be taken up without trouble—bending or cutting of strands is eliminated. Easy to install and the strongest cable grip made.

Bulletin 600 describes this and other mechanical connectors.



"A" Type, Class 4400 Street Cable Grip.



"A" Type, Class 9100, Transmission Connection.

F. M. C. Transmission Line Connection

Strongest and Highest Conductivity. Prevents loose joints due to expansion and contraction strains. Bulletin 402 describes this and other F. M. C. electrical connections.

Fargo Mfg. Co., Inc., Poughkeepsie, N. Y.

ORANGEBURG FIBRE CONDUIT

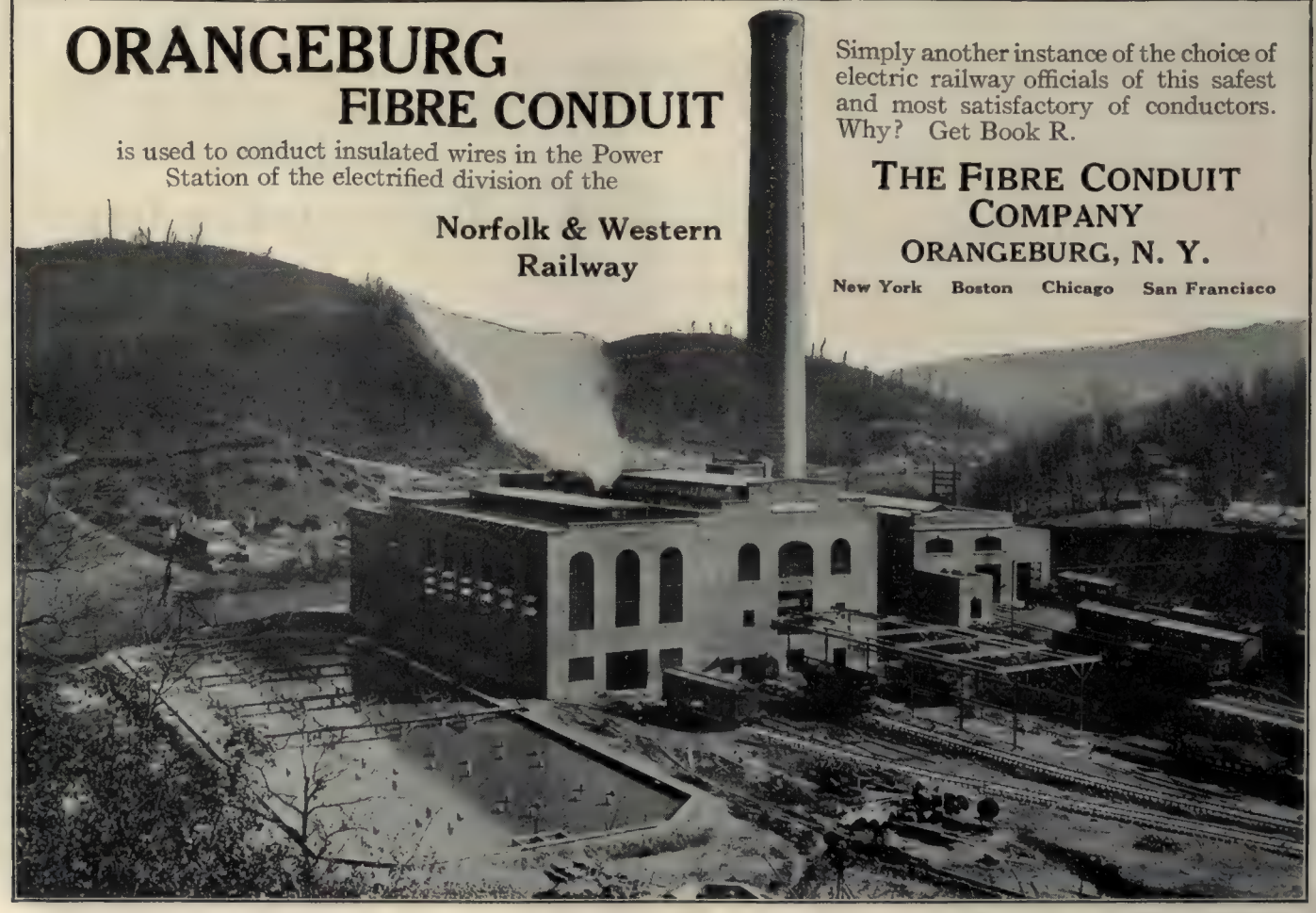
is used to conduct insulated wires in the Power Station of the electrified division of the

Norfolk & Western Railway

Simply another instance of the choice of electric railway officials of this safest and most satisfactory of conductors. Why? Get Book R.

THE FIBRE CONDUIT COMPANY
ORANGEBURG, N. Y.

New York Boston Chicago San Francisco



"Just stick in the wire and tighten with a wrench!"

DOSSERT CONNECTORS

connect *without* solder — *without* trouble — *without* delay. They're ready-made joints — wonderful little means of efficiency when it comes to making quick changeovers on your switchboards, transformers or brush holders. You can use them for connections *everywhere*—in shop, car, power-house and out on the line. Let us tell you about Dossert Service at the same time we send free sample—write.

Dossert Cable Tap

Have you our* Tenth Year *Catalog?

Dossert & Company

H. B. LOGAN, President, 242 West 41st Street, N. Y.

Little things these—but vital to your line

A weak strain insulator—a faulty hanger—a defective splicing ear—may cause a lot of trouble at a most inconvenient moment. Big responsibilities rest on these "little" details of overhead construction. The selection of materials—the painstaking care and skill devoted to design and construction—the scrupulous inspection—that goes into the production of Macallen overhead specialties is in every way commensurate with the importance of the work these "little things" must do.

The least detail of the Macallen Line is of the First Importance

TRADE MACALLEN MARK.

The Macallen Company

Macallen and Foundry Sts., Boston

TRADE MACALLEN MARK.

7240

This Crossing Is Safe

It is Positively Guarded

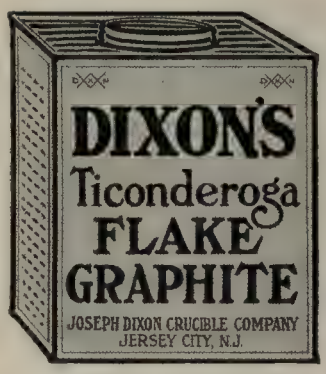
by a barrier that cannot be ignored and a warning bell which clangs out the coming of the car.
Prevention of accidents is here practically assured by the

Cook Automatic Signal Gate

At night there are the flashing red light and the illuminated semaphore.
Claims for damages weaken, when the "Cook" looms as a convincing witness.
Don't you think you ought to investigate? Do it at once—before the heavy traffic (both car and highway) of the summer season sets in.
You cannot afford to let those crossings go unprotected during this season of straw rides, joy rides, etc.

The Cook Railway Signal Co.
1793 South Broadway, Denver, Colo.

The "teeth of friction" can't bite if you lubricate with—



There's only one way to get perfect lubrication, and that way is to eliminate the "teeth of friction" the minute imperfections which, in even the most highly finished bearing surfaces show, under microscope, like hills and dales. Oils or plain grease are only transitory lubricants, subject to the whims of load, pressure, climatic and other conditions. Flake graphite, unlike oil or plain grease, is not squeezed out by pressure, and unlike other forms of graphite, does not remain suspended in oil, and is therefore not floated away. Pressure forces flake graphite upon the tiny projections—"the teeth of friction"—the flakes become pinned and form over the surface a most marvelous veneer-like coating, unctuous and wonderfully smooth. Dixon's Flake Graphite will improve the efficiency of the oil or grease that you are using. Thousands of expert engineers all over the world have proven this to *their* satisfaction. Why not write for sample No. 108-C and prove it to *your own?*

Made in Jersey City, N. J., by the

Joseph Dixon Crucible Co.

Established 1827

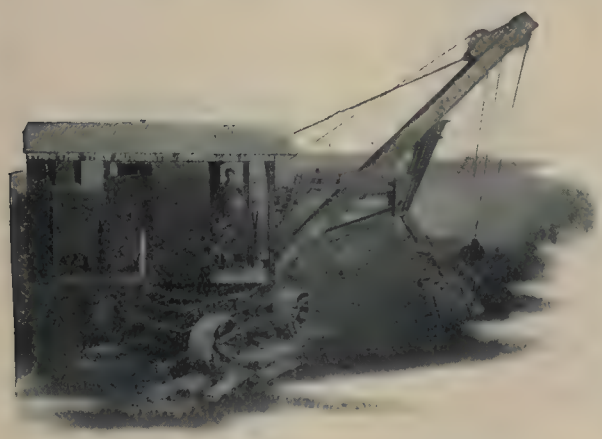
D X N TRADE MARK D X N TRADE MARK

C-69

THE THEW SHOVELS
FULL CIRCLE SWING THEW HORIZONTAL CROWDING MOTION STEAM SHOVELS

The Thew Gasoline Shovel—

Ideal for Excavating New Lines or Grading Interurban Roadbeds


Type O Thew Gasoline Shovel—¾-yard Dipper.

IN instances such as these, when power cables are not already strung or the source of fuel is far removed, the Thew Gasoline Shovel is ideal.

It has all the advantages of standard Thew Shovels; is strictly a one man machine; consumes only 20 to 30 cents worth of gasoline per hour; requires no licensed operator; avoids expense of hauling coal and inconvenience of this kind of firing; is economical in use of water; can later be changed to an electric shovel if desired, by substituting an electric motor and equipment instead of the gasoline engine, and has many other advantages.

These are explained in a special gasoline shovel circular which will be sent upon request.

Sign and Mail or Use for Memorandum

The THEW Automatic Shovel Co., Lorain, O.

Send me special gasoline shovel circular with any other interesting data about gasoline shovel as advertised in Electric Railway Journal.

Name.....

Address.....

THE THEW AUTOMATIC SHOVEL CO. LORAIN OHIO

Combine Your Electric Railway and Electric Lighting Pole

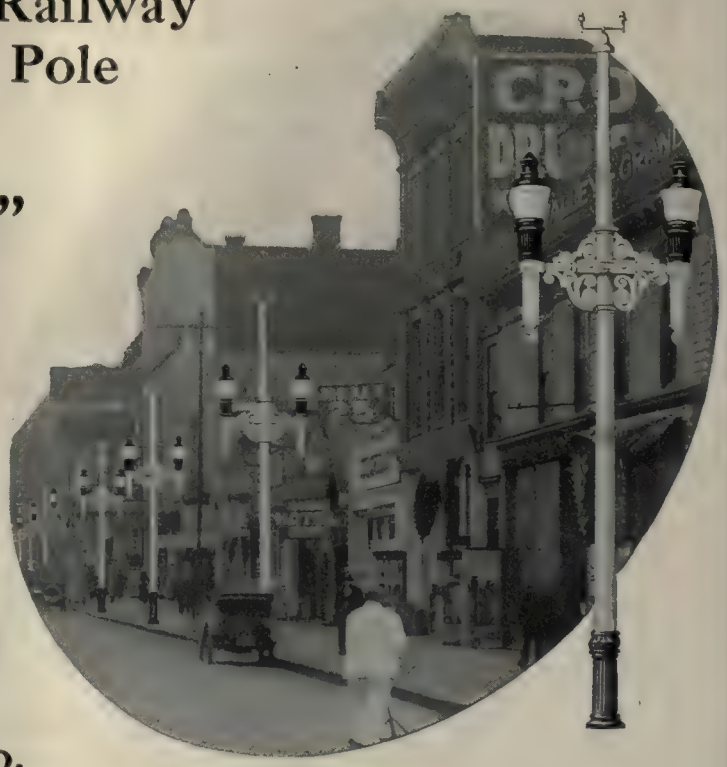
"ELRECO COMBINATIONS"

are your big opportunity for cutting line upkeep. Here is the economy you have been considering, discussing and advising. These "double-purpose" poles will halve your initial cost.

And at the same time their patented "Wire-Lock" Swedge Joint features make "Elreco" poles corrosion-resisting and proof against telescoping.

Sounds good?

Get the data.



Electric Railway Equipment Co.
Cincinnati, Ohio

New York **30 Church St.**

Send for Catalog No. 16

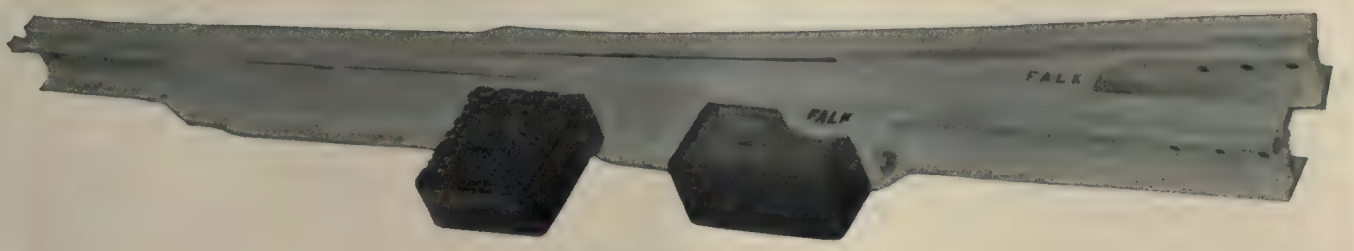
Frogs, Crossings, Switches and Mates for Electric Railway Service

Products of the Highest Grade Workmanship and Material.
May we Estimate on Your Requirements?

BARBOUR-STOCKWELL CO.
205 Broadway, Cambridge, Mass.

Falk Special Track Work

DOES REDUCE YOUR MAINTENANCE CHARGES



Solid Manganese Steel Switch

For Maximum Service

The Falk Company

Milwaukee

NEW YORK CITY—Wendell & MacDuffie Co.

LOS ANGELES—Alphonso A. Wigmore

NEW ORLEANS—A. M. Lockett & Co.

The Double Take-Up Saves Time

which is one reason why

Anderson Improved Wood Strain Insulators

are economical

Another point which means money to you is that the Insulators have great tensile strength. Breakdowns are well-nigh impossible. All parts are rust-proof, preventing setting of the threads.

From the electrical standpoint, you are offered the absolute insulation which is a feature of all Anderson line insulators.

Modern electric railway practice has found an important adjunct in Anderson Products.

Send for the Catalog today.

Made the Anderson Way

Albert & J. M. Anderson Mfg. Co.

289-293 A Street (Established 1877) Boston, Mass., U. S. A.

BRANCHES:
New York, 135 Broadway
Chicago, 105 So. Dearborn Street
Philadelphia, 429 Real Estate Trust Bldg.
San Francisco, 613 Postal Telegraph Bldg.
London, 48 Milton St.

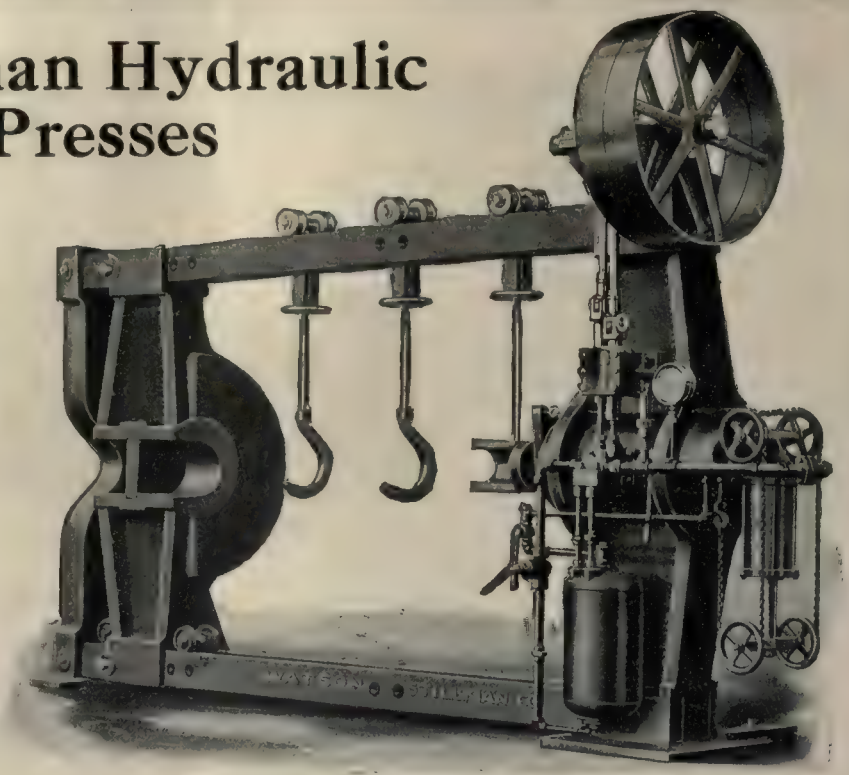
Watson-Stillman Hydraulic Wheel Presses

EMBODY THE MOST ADVANCED IDEAS IN WHEEL PRESS CONSTRUCTION. WE SHOW ONE HERE, OUR MOST RECENT DEVELOPMENTS IN WHICH THE RAM MOVEMENTS ARE CONTROLLED BY OUR PATENTED HYDRO PNEUMATIC DEVICES.

In this type compressed air is used for the run-out of the ram and also for the pull-back, in place of counterweights.

We build a number of efficiency producing hydraulic tools for railway service, including jacks, pit jacks, shears, benders, forcing presses, box forcing presses, shaft straighteners, bulldozers, etc.

Write for Catalog 82.



300 Ton Hydro Pneumatic Wheel Press

The Watson-Stillman Co., 46 Church St., NEW YORK

Engineers and Builders of Hydraulic Machinery

CHICAGO—McCormick Building PHILADELPHIA—The Bourse

290

The Hand Chain Cannot "Gag" if you use the

FORD

TRIBLOC CHAIN HOIST

because the Tribloc is provided with the patented Loop Hand-Chain Guide, which prevents overriding of the Hand Chain and insures a safe and easy-running hoist.

Steel parts are used instead of iron, thereby increasing the life and strength of the Block.

Eighty per cent. of the power applied to the hand chain of a Tribloc is converted into lifting energy.

We guarantee Triblocs for five years—if they were not as strong and as good as it is possible to make a hoist we could not do it.

Write for our catalogue

FORD CHAIN BLOCK & MFG. CO.

142 Oxford Street PHILADELPHIA, PA.

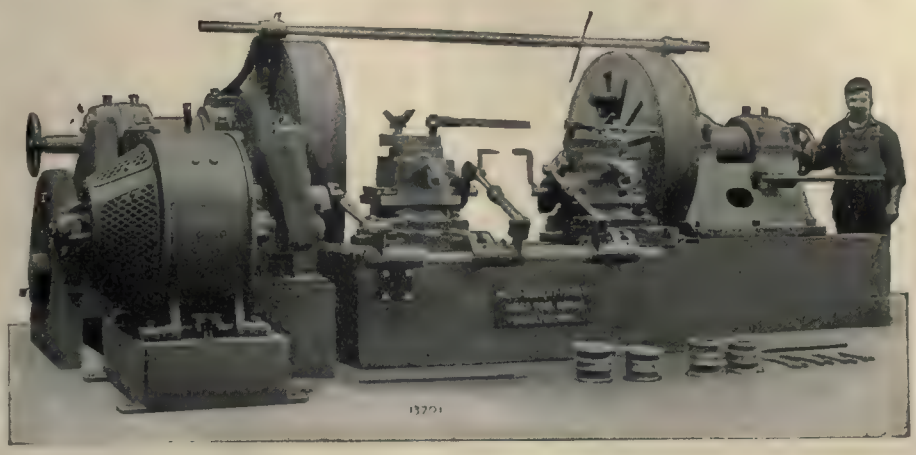
A More Rapid and Efficient Repair Shop

Don't neglect your repair shop equipment. Get away from the idea that any machine that can do the job is good enough. N.B.P. Machine Tools for Electric Railway Repair Shops are heavy and powerful, yet easily and conveniently handled.

They will

Get Out the Work as Fast As Possible

and do it right.



Niles Standard Car Wheel Lathe

Especially adapted for rapid turning of trolley-car wheels. It is turning 12 to 18 pairs every day in several of the largest street railway shops. Provided with convenient calipering device, "Sure-Grip" drivers and patented tool clamps operated by a single screw.

NILES-BEMENT-POND CO.

111 BROADWAY, NEW YORK

Boston Pittsburgh Birmingham, Ala. Philadelphia Cleveland Chicago St. Louis San Francisco London

For Safety's Sake—For Economy's Sake

install the

S. W. B.

Automatic Shim Slack Adjuster

on *all* your cars

It gives the motorman quick, powerful control of his brakes. It gives brake shoes a double lease of life. Flat wheels are unknown on "S.W.B." equipped lines.

The "S.W.B." takes up the slack as fast as the shoes wear.

There's a money saving story in our descriptive bulletin. Write for it.

THE SAUVAGE-WARD BRAKE CO., INC.

Whitehall Building, New York

Agents for Virginia, North and South Carolina and Georgia: J. B. N. Cardoza & Co., Citizens Bank Bldg., Norfolk, Va.
W. R. Kerschner Co., Inc., 50 Church St., New York, Eastern Sales Agt.

B-V.
TRADE MARK
REGISTERED

A Guarantee
of faultless
Punch Service

Write for Catalog

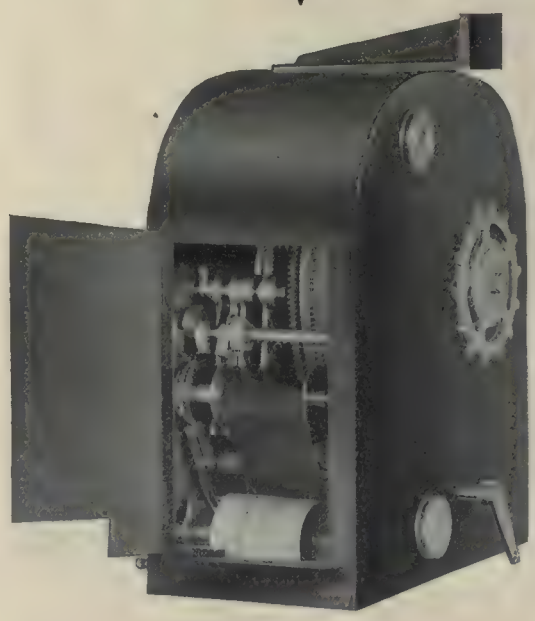
BONNEY-VEHSLAGE TOOL COMPANY

124 Chambers Street, New York

Factory, Newark, N. J.

The Machine
that does the work

The Dial
that creates publicity



Scientific design to cover every contingency that might arise in fare recording has produced a machine well-nigh perfect in the

Bonham
Traffic Recorder

The fare collection is a distinct act of publicity. The fare recording is a complete statement for the accounting department.

The result from the company's standpoint is profitable railroading with the uncertainty left out.

Send for the Catalog

"Earnings per Passenger Mile"

The Bonham Recorder Co., Hamilton, O.

2614

For Low Window Maintenance

EDWARDS
Car Window Fixtures

Your car windows are either costly or low in maintenance, depending upon their proper working of the fixtures.
In this respect Edwards fixtures bring costs down to bed rock.
They are permanently rattle-proof, permanently tight without binding, permanently positive in holding qualities. Small prices for big service.
Write for details and prices.

The O. M. Edwards Co., Inc.

Syracuse, N. Y.

Metal Extension Platform Trap Doors
Top, bottom & side Weather-stripping
Railway Devices

Window Fixtures
All-Metal Sash Balances and Shade Rollers
Metal Sash and Mouldings

CAMBRIA

T-RAILS

Open Hearth and Bessemer
Track Bolts and Nuts

AXLES

Cambria Special

Rolled in the old way—the Cambria way. Slow reduction from ingot means maximum density and homogeneity.

Our axles represent the highest development in the art of heat treating. Axles for street and interurban lines, our Specialty.

CAMBRIA STEEL COMPANY

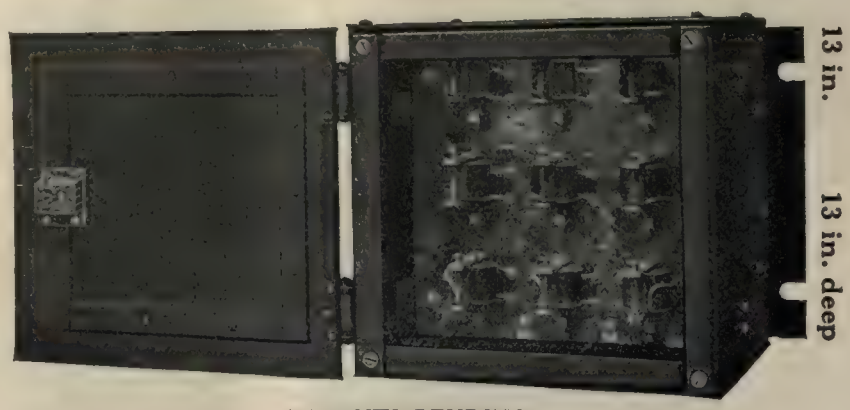
General Sales Office: Morris Bldg., PHILADELPHIA

Sales Offices: Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Detroit, New York, Philadelphia, Pittsburgh, St. Louis, San Francisco, Tacoma, Montreal
Works at Johnstown, Pa.

End Car Lamp Flickering

Install the Watson Voltage Regulator

14 inches 17 inches



PATENTS PENDING

IT WILL KEEP THE VOLTAGE IN THE LIGHTING CIRCUITS WITHIN 7% VARIATION EVEN WHEN LINE VOLTAGE FLUCTUATES FROM 650 TO 300 VOLTS.

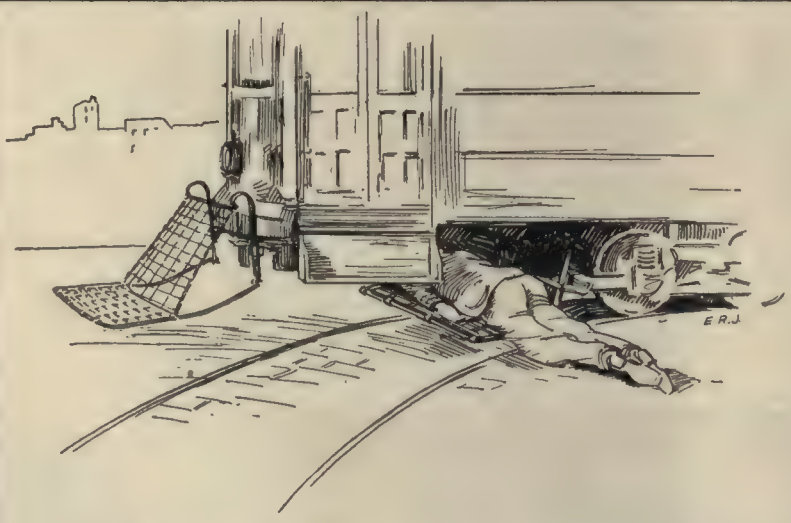
You do not have to make any important car wiring changes.

The Regulator itself is simple in character and requires no attention after installation, except a yearly change of small contacts.

Acquaint yourself at once with the Watson. Full information will be sent you at your request.

If desirous of knowing cost of installing the Regulator on your cars, send us wiring diagrams and voltage and amperage of headlight.

Thos. S. Watson Company, Milwaukee, Wis.



It happened on a Curve!

But the

PARMENTER WHEEL GUARD Saved Him

Make your cars ready for *any* emergency. When rounding curves fenders project out on a tangent leaving the front wheels exposed—careless pedestrians often stumble on curves. Be ready for the emergency.

Parmenter Fenders and Wheel Guards do great "team-work." On curves and at all times the wheel guard furnishes that final perfection in safety which every street railway needs. Anybody who gets by the fender is protected *positively* from the wheels. Your claim agent will welcome the advent of this combination.

Parmenter Fenders are called the "four-way" safeguard. The latest model is locked against the dangerous rebound action. *Write for the interesting details of this new model Parmenter.*

Parmenter Fender & Wheel Guard Co.

89 State Street, Boston, Mass.

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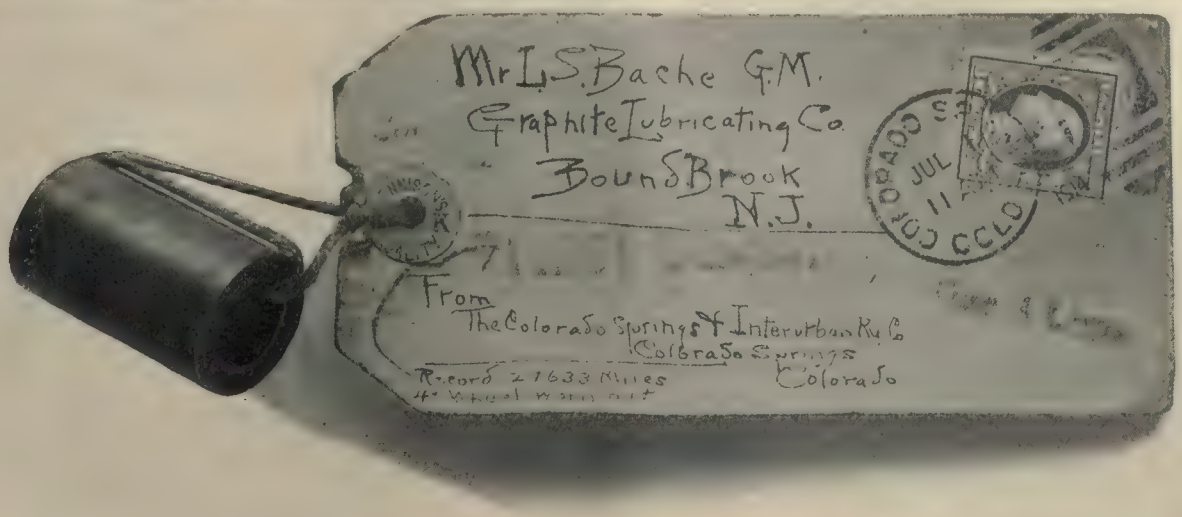


27,633 Miles

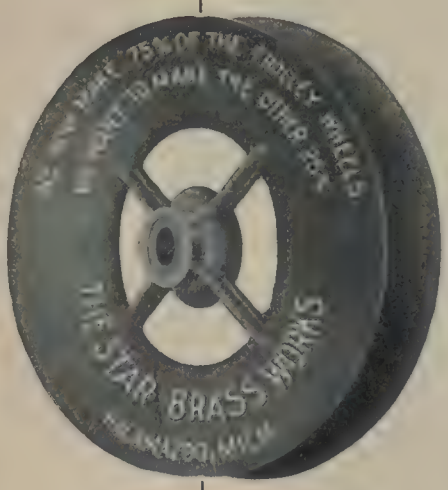
A "Bound Brook" Trolley Wheel Bushing record

While a 4″ wheel was worn out the "Bound Brook" was not

All genuine graphited "Oil-less Bearings" have always been made at Bound Brook, N. J., in the United States of America.

Graphite Lubricating Co.

Reason It Out—



¶ You want a metal in the *rim* of your trolley wheel that won't hurt the wire, but that will last—a metal that will be *soft* yet *tough*.

¶ You want a metal in the *bushing* of your trolley wheel which will be strictly a *bearing* metal.

¶ You want both in the same trolley wheel.

¶ Well, you get it in

Kalamazoo Trolley Wheels

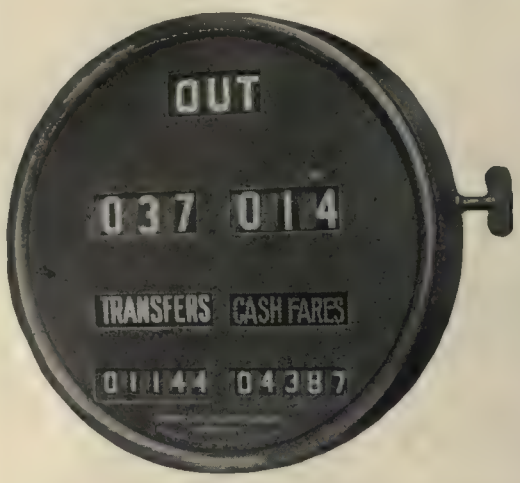
¶ It saves the wire. It saves current loss. It saves the wheel.

¶ Economy as well as common sense dictate that you come to the largest exclusively trolley wheel makers in the world.

THE STAR BRASS WORKS

KALAMAZOO, MICH., U. S. A.

STERLING



Trolley Supplies

Fare Registers

Sterling single and double registers are full geared throughout. Therefore they cannot be manipulated. Having comparatively few parts—maintenance cost is negligible.

Trolley Retrievers

Famous for their prompt, positive action and few moving parts. Only a wrench needed to remove the case. Backed by the Sterling five-year guarantee.

THE NEW HAVEN TROLLEY SUPPLY COMPANY

NEW HAVEN, CONN.

MANUFACTURERS OF FARE REGISTERS AND RAILWAY SUPPLIES

The McLain No. 25 Extended Dash

The Lightest Headlight Made 7 lbs. Complete

Perfect Focussing Brilliant Light using a Concentrated Filament Mazda Bulb

Strong, compact with the casing of No. 18 Gauge Pressed Steel throughout. The front door is carried on an extra strong hinge riveted to the main casing.

Dustproof. Waterproof. All parts adjusted to expansion and contraction. The front glass is 8⅜ in. in diameter and sealed against breakage by shock.

Send for the complete facts today.

THE TROLLEY SUPPLY CO. **Canton, Ohio**

EARLL

In every line of manufacture there is always ONE name that stands out prominently as a synonym for dependability.
In

Catchers
and
Retrievers
that name is

EARLL

For more than fifteen years its use has been the standard practice.
When you buy the Earll you are not paying for an experiment—you simply buy known service.
For light cars, Earll Retrievers and Catchers are the lightest on the market.
Write for the Earll proposition.

C. I. EARLL

Factory: York, Pa. Offices: 11 Broadway, N. Y.

W. R. Kerschner Co., Inc.
50 Church Street, New York

The Grayson Railway Supply Co.
St. Louis, Mo.

The John S. Black Co.
New Orleans, La.

Multiply the number of cars on your line by 500 lbs. per car, and it will give you an idea of the dead weight your power house is forced to carry with metal conduits.

With

DURADUCT

Reg. U. S. Pat. Off.

Flexible—Non-Metallic Conduit

you get rid of 500 lbs. per car—a definite big yearly cut in operating expenses.

You get a conduit which will save you money in installation.

Its "roller bearing" wireway will save your men time in wire fishing.

Its single wall is well-designed protection against blister, burn or breakdown.

The "condulets" used with Duraduct are very light and easy to install, as they require no threading.

Duraduct is an Ideal Conduit for light cars.

We have been talking car-use. But if you will consider Duraduct advantages, you will see how much it will fit into the scheme of all wire protection in power house, substation or repair shop.

"Duraduct for Durability"

Tubular Woven Fabric Co., Mfrs. Pawtucket, R. I.
A. HALL BERRY, General Sales Agent
97 Warren St., New York 309 So. Clinton St., Chicago

Look Beyond!

3243

Look beyond the first cost of brushes if you want real economy.

Bed-rock costs can be obtained only by paying a little *more* per brush and a lot *less* per year.

That is the experience of Le Carbone brush users.

W. J. Jeandron
173 Fulton St., New York

Pittsburgh Office—636 Wabash Bldg., W. P. Poynton, Engr.
Chicago Office—1657 Monadnock Block, J. C. Kyle, Engr.

Commutator Wear Reduced 90%

Undue friction between brushes and commutator means wear, cutting, heating, sparking. The result is big maintenance expense and loss of power.

"No Spark" Carbon Brushes

make brush contacts practically frictionless. They reduce commutator repairs enough to pay for brushes several times over. They run the machine noiselessly and at highest efficiency without sparking. "No Spark" brushes carry more load than any other brush on the market, are permanently self-lubricating, are moisture proof and will not chip, split or break.

Write our engineering department and let them show you the way to permanent brush-satisfaction and brush economy. Ask for a sample of the kind you can use.

Calebaugh Self-Lubricating Carbon Co.
1502 Columbia Ave., Phila., Pa.

This method of suspension

is used on Chillingworth cases wherever motor requirements permit.

Experience has proved that this type of suspension is immune to vibration and its consequent evils.

Chillingworth cases are Seamless and Rivetless.

Thayer & Co., Inc., Ag'ts
111 Broadway, New York

Representatives:
U. S. Metal and Mfg. Co., Southern and New England States.
Allen General Supplies, Toronto.
M. F. Keegan & Company, Chicago.
Grayson Railway Supply Co., St. Louis.
Union Electric Company, Pittsburgh.
Brown & Hall, Western States.

"VD&D" GEARS AND PINIONS

Strength That Wears Well

Men and gears are alike in this, that some can lift a tremendous weight, but cannot carry any load very far—that's strength minus; while some can carry a load indefinitely, but cannot lift much of a weight—that's endurance minus.

A few men can do both; they are all-round men. A few gears have both strength and endurance; they are Van Dorn & Dutton Gears.

Traction service demands all-round gears, gears that stand up both under sudden strain and under long steady grind.

Here are two "V D & D" grades that are meeting these conditions today wherever operating efficiency is found.

Grade HARDENED—with the emphasis on wear.

Grade TREATED—with the emphasis on strength.

Write for our treatise on "A Feature of Lowest Operating and Maintenance Cost."

THE VAN DORN & DUTTON COMPANY.
GEAR SPECIALISTS
NEW YORK CLEVELAND SAN FRANCISCO
CANADIAN REPRESENTATIVE, C. E. A. CARR, 2 TORONTO ST., TORONTO, ONT.

This Problem Solved Like a Thousand Others

Owing to changes in the plant, it was necessary to shorten this 7600-lb. cast-iron steam-turbine connection, or to replace it by a new casting costing about $300, and requiring about 25 days to make and deliver.

There was only one way to shorten the casting.

An 18-in. section was cut from the connection and the flange welded into place so exactly that the three flange surfaces fitted perfectly when the casting was replaced in the line.

Oxwelding solved this problem at a fraction of the time and expense required to obtain a new casting of the correct size. This job represents but one of the unlimited applications of

The OXWELD PROCESS

to repair problems of every description in the electric railway field.

Oxweld equipment can be used to reclaim broken castings and forgings from the scrap pile—to repair track work or apply bonds out on the line—to a thousand and one money and time-saving uses in shop work and maintenance.

Flange Welded on Shortened Connection and the 18-in. Section That Was Removed

We have prepared a series of bulletins giving valuable information on the Oxweld Process. They will be sent free on request. Send for them today—Bulletins Series 700.

OXWELD ACETYLENE CO.

Los Angeles, Cal. CHICAGO Newark, N. J.

Largest Makers of Welding and Cutting Equipment and Supplies in the World.

Railway Devices of Known Merit

Device No. 1—DIFFERENTIAL STAFFLESS BRAKE
The most powerful and compact hand brake ever manufactured.

Device No. 2—GIANT PERFECTED HAND BRAKE
The well-known "Sterling" device with improved features.

Device No. 3—STERLING TROLLEY BASES
(See illustration.)
The *original* "Sterling" light-weight, low-level, roller bearing base.

Device No. 4—MULTI-VAPO-GAP LIGHTNING ARRESTERS
A compact arrester with visible spark gap. No maintenance due to absence of moving parts.

Device No. 5—THE Q-P TROLLEY CATCHER
A modern device of simplified construction. Practically no maintenance cost. Composed of only *four* parts.

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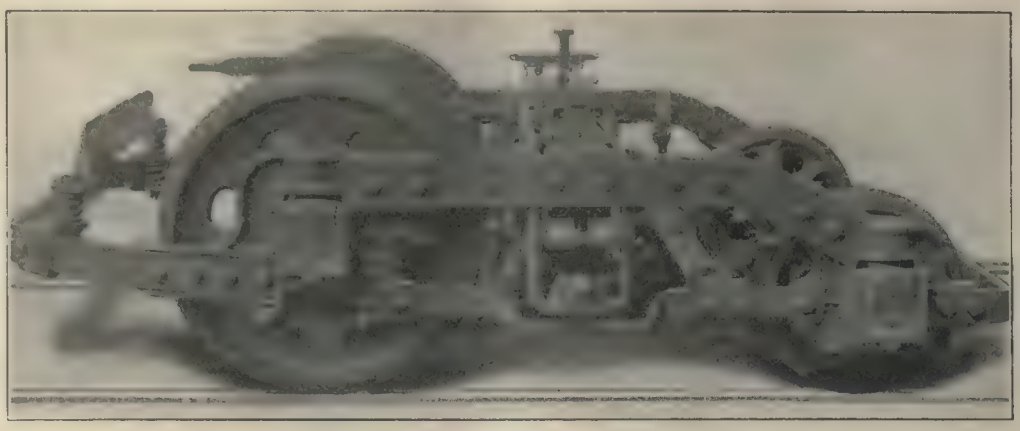

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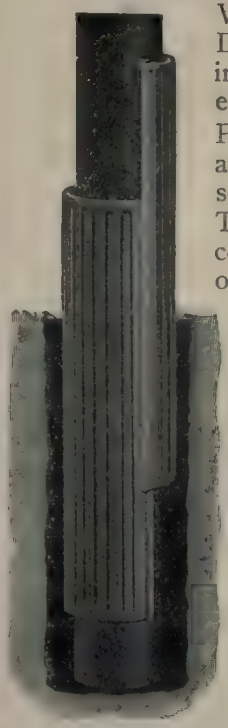

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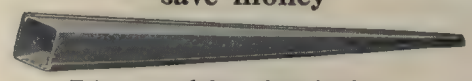

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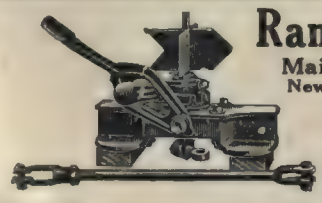

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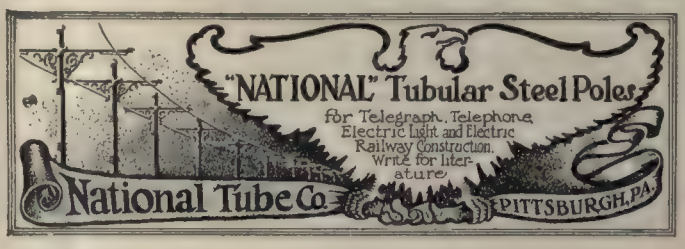

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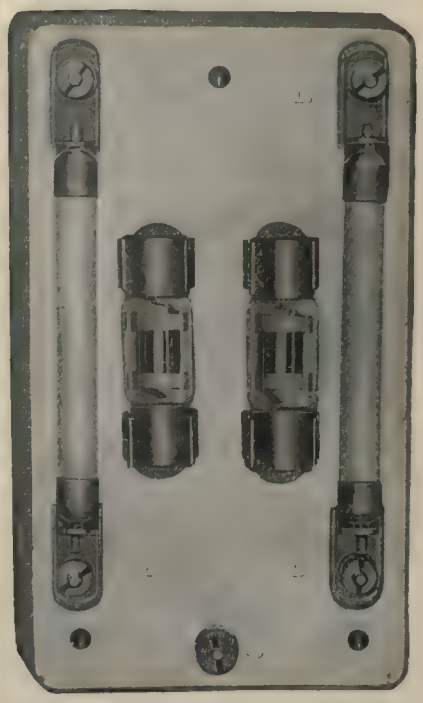

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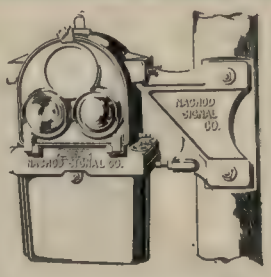

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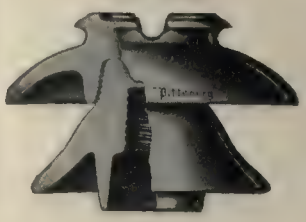

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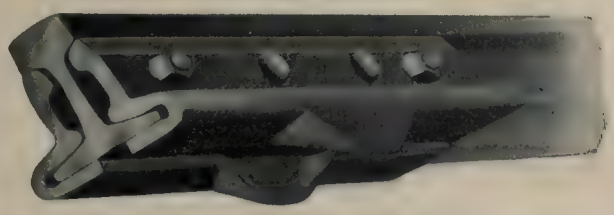

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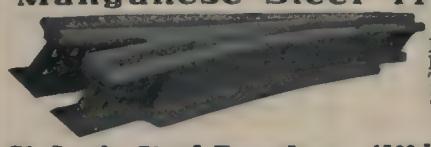

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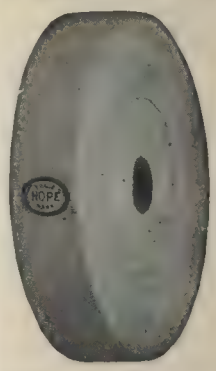

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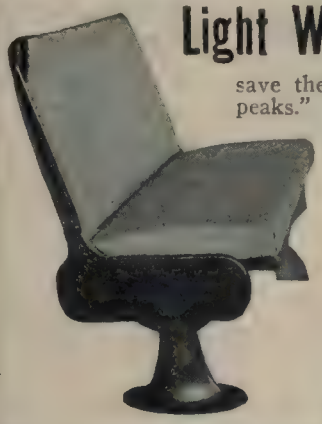

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save the drain on current at "traffic peaks."

WALKOVER
Pressed Steel Seats

give more room—more comfort—more money value than any other seat. *Specify them for your new cars.*

Hale and Kilburn Company
New York Philadelphia Chicago

PANTASOTE

The National Standard for Car Curtains and Car Upholstery

AGASOTE HEADLINING

The only headlining made in one solid piece. Will not separate, warp or blister. Waterproof and homogeneous.

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MASON SAFETY TREADS—prevent slipping and thus obviate damage suits.
KARBOLITH CAR FLOORING—for steel cars is sanitary, fireproof and light in weight.
STANWOOD STEPS—are non-slipping and self-cleaning.
Above products are used on all leading Railroads. For details address
AMERICAN MASON SAFETY TREAD CO.
Main Offices: Lowell, Mass. Branch Offices: Boston, New York City, Chicago, Philadelphia, Kansas City, Cleveland, St. Louis.

Railway Headlights
Used by 203 Railroads

See Our Full Page Advertisement in June 26th issue

The ESTERLINE Co.
Indianapolis

U. S. Metal & Mfg. Co.

165 BROADWAY, NEW YORK CITY
Chicago Atlanta

RAILWAY SUPPLIES

Selling Agents for Dunham Hopper Door Device—Feasible Drop Brake Staff—Columbia Lock Nut—Kling Bolts—Shop Cleaner—"Texoderm". *Sole Eastern Agents for* St. Louis Surfacer & Paint Co. *General Eastern Agents for* Hutchins Car Roofing Co.—Multiple Unit Puttyless Skylight—Car and Locomotive Jacks—Electric Arc Welders. *Special Agents for* The Tool Steel Gear & Pinion Co. *Special Agents for* C & C Electric & Mfg. Co. *General Agents for* Anglo-American Varnish Co. *New England and Southern Agents for* Thayer & Co.—Chillingworth Seamless Gear Cases. *General Eastern Agents* for the Union Fibre Co.

A 63% SAVING *in* Fuse Costs

Over New Fuses

The UNION Indicating FUSE

"The Dependable Fuse"

Ask for "26-R"

Built in 600 Volt and 250 Volt capacities, N. E. Code Standard, especially for electric railway service.

Carefully assembled. Built of high grade materials. Positive in action.

Write for This Booklet
Mailed on Request

CHICAGO FUSE MFG. CO.
1016 Congress St., Chicago

TICKETS
as well as
CASH FARES

Try these boxes on your one-man cars

Cleveland Fare Box Co.
CLEVELAND, OHIO

The JOHNSON Registering Fare Box

For Cash Fares

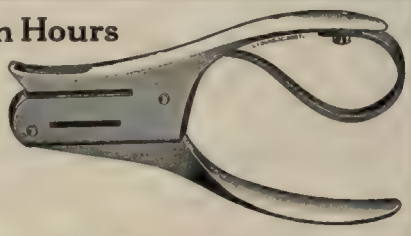
—increases fare receipts 2 to 15 per cent.
—is the fare box you can rely on for certainty, accuracy and economy.

Johnson Fare Box Company
Jackson Blvd. and Robey St.
CHICAGO
30 Church St., NEW YORK

For Cash Fares and Tickets

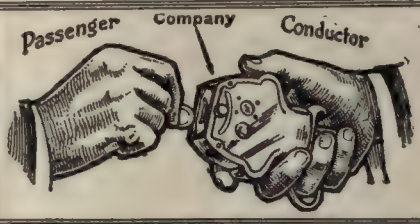
Speed in Rush Hours

Woodman Quality Punch



Conductors handle the crowds quicker when they can pass out transfers fast. A good sharp *punch* is a big help. Buy the punch that stays sharp—the punch with the tool-steel die.

The R. Woodman Mfg. & Supply Co.
63 Oliver Street, Boston, Mass.
E. G. Long Co., 50 Church St., New York City
Eastern Electrical and Export Representatives 948



Direct Automatic Registration By the Passenger

Rooke Automatic Register Co.
Providence, R. I.

The Best Shade Rollers For Cars

SPECIAL shade rollers for cars, that will last and give satisfaction for years, and yet cost but little more than the poorest you can buy, are made by the Stewart Hartshorn Co., E. Newark, N. J. This company is by far the largest shade roller manufacturer in the world. It is able to give high quality at lower prices because of the enormous output. Write for catalog, stating wants. You are always protected, when you buy shade rollers, if they bear the signature.

Stewart Hartshorn

IN A WORD
THE RAPID READY CHANGE CARRIER

25 - 10 - 5 - 1 or 5

enables conductors to give change quickly. Passengers can pass into car immediately—Prevents crowded platforms—Shortens time at car stops. Just what you need. Price, $1.75.

CHAS. F. ETTER
904 N. 2nd St., Harrisburg, Pa.

Ventilation—Sanitation—Economy—Safety

All Combined in

THE COOPER FORCED VENTILATION HOT AIR HEATER

Patented September 30, 1913. *Ask for the full story.*

We Also Manufacture Pressed Steel Hot Water Heaters

THE COOPER HEATER CO., CARLISLE, PA.

MAKE THE BEST

THE RAILWAY SUPPLY & CURTAIN CO.
CHICAGO
CAR CURTAINS & FIXTURES FOR ALL PURPOSES
CATALOGUE ON REQUEST

Heating and ventilating your cars is the problem today. Let us show you how to do both with one equipment. Now is the time to consider this change before you start your cars through the shops for overhauling. Kill two birds with one stone.

THE PETER SMITH HEATER COMPANY
1759 Mt. Elliott Ave., Detroit, Mich.

From Three to Four Years

is not an uncommon record for Bayonet Harps to wear.

There are BAYONET BASES that have been in service for ten years and are still good.

Bayonet equipment wears longer, because made better and is the easiest and cheapest maintained.

UNIFORM TENSION

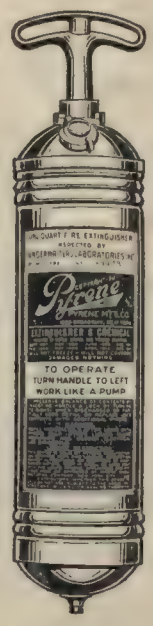
PERFECT ALIGNMENT

Sold subject to your entire satisfaction or your money back.

BAYONET TROLLEY HARP CO.
Springfield, Ohio

Wm. R. Garton, Sales Engineer, 299 Broadway, New York City, N. Y. John S. Black Co., Sales Agents 908 Hennen Bldg., New Orleans, La. Satterlee Elec. Co., Hall Bldg., 9th and Walnut Sts., Kansas City, Mo. O. H. Davidson Equipment Co., Ideal Bldg., Denver, Colo.

FIRE!



A Car Fire—
A Power House Fire—
A Sub-Station Fire—
A Subway Fire—
A Car-Shop Fire—

When it starts in the proximity of dangerous voltages—

What are you going to do to stop it without your body forming a circuit with any jet you may want to play on the danger spot?

The answer is—

Pyrene TRADE MARK

the highly dielectric extinguisher. Kills the fire—and has been projected against 110,000 volts without injury to the user.

Get the booklet "Pyrene for Electric Service."

PYRENE MANUFACTURING CO.
52 Vanderbilt Ave., New York
Branches in all large cities

The Cars were unusual—but the Ventilators were

"GLOBE"
as usual

The East Liverpool Traction & Light Company have recently received what they term "all-service" cars. "Globe" Ventilators provided in the turtle-deck type roof insure complete ventilating service. How? Why? Write for complete data.

Globe Ventilator Co., Troy, N. Y.

4741

Get Our Price Lists on **BADGES** and **PUNCHES**

AMERICAN RAILWAY SUPPLY CO., 134-136 Charles St., NEW YORK

Eclipse and Acme Fenders Give Immunity from Accident Suits

The function of any fender is to protect the human body from the first impact with car body. That the "Eclipse" does this successfully up to speeds of thirty miles per hour is being demonstrated daily throughout the country.

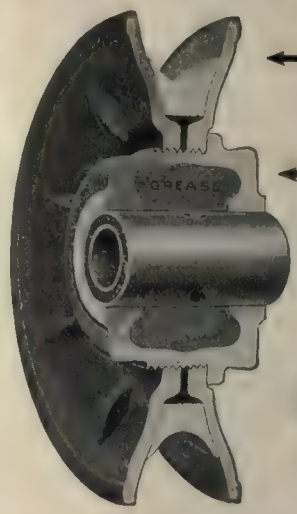
The Eclipse Trolley Retriever

is designed for any range of service. Retrieves in less than three inches. Compulsory set; weak spring controlled by thumb nut on face of casing. No tools required for winding or adjusting. Fool proof. Furnished with open or closed rope drum. Use knotted rope or ferrule, as preferred. Less parts than any other retriever on market.

Will send sample for trial.

ECLIPSE
RAILWAY SUPPLY CO.
Cleveland, O.

Universal Trolley Wheel



← Renewable Wearing Parts

← Grease Packed

← Bushing Slotted to feed Lubricant to

Interlocked Grease Pockets

Simple—Yes —and

THE PRICE WILL INTEREST YOU.

The Universal Trolley Wheel Co.
Northampton, Mass.
AUTOMATIC VENTILATOR CO., Sales Agent
2 Rector St., New York City

Helps Keep Your Car Out of the Repair Shop

There is no doubt that the use of Post's "Zero" Metal is saving many companies large sums which repair work on car axles would represent. It is a car-bearing metal PAR EXCELLENCE.

And for motor-bearing purposes, Post's Motor Metal is an equally economical factor. Both are made of Virgin raw materials only.

For Your Armature Bearings
Post's "Motor" Metal

E. L. POST & CO. Inc., Sole Manufacturers
50 Cliff Street New York

Full Power with High or Lower Adjustment

Many emergencies requiring a powerful jack present a difficulty in bringing the jack to bear on the load. The

Buckeye Emergency Jack No. 239 Special

saves time, strength and trouble. The many positions to which it is adjustable easily solve perplexing lifting problems. Full details in our catalog. Write for it.

The Buckeye Jack Mfg. Co.
Alliance, Ohio

7179 3

N-L SPECIALTIES

Pneumatic Sanders, Valves, Hoppers of Special Design, Spring Wire Hose, Hose Clamps, and Cotton Hose.
Deck and Roof Car Ventilators.
Selector Switches for High Unit Lighting.
Interchangeable Marker Lanterns, Semaphore Lenses.
Lintern Tail Light and Indicating Train Signal.
Modern and economical method of Switch Stand Lights.
"STOP" Signal Lanterns and Switches.
Resistance Units for special purposes.

WRITE US FOR PARTICULARS.

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CLEVELAND, OHIO
REPRESENTED BY:
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Car Roof Preservation
comes with
Bayonne Car Roofing

The waterproof, sun-proof, storm-proof, age-proof specially prepared canvas roofing.

John Boyle & Co., Inc., 112 Duane St., New York
Branch House: 202-204 Market St., St. Louis, Mo.

The "Hycap-Exide" Battery
for
STORAGE BATTERY STREET CARS
THE ELECTRIC STORAGE BATTERY CO.
PHILADELPHIA

Reduce Gear and Pinion Maintenance

WHITMORE'S GEAR PROTECTIVE COMPOSITION

Whitmore Manufacturing Co.
Lubricating Engineers
CLEVELAND OHIO

Whitmore Product Sales Company
Monadnock Bldg., Chicago
Western Branch Office

BRAKE SHOES

The "Show Me" Spirit Is a Good Sign

The spirit of today is *"show me"* — and the reputable and successful company has to *show 'em.*

We've followed the policy of "showing" the electric railway industry good brake shoe service ever since we started in the business. *Service* is the keynote of our business. The records of roads which use our service brake shoes back up these statements. Get the data.

American Brake Shoe & Foundry Co.
MAHWAH, N. J.
30 Church St., New York McCormick Bldg., Chicago
71609 2

TULC

WARNING (Fac-simile of tag)

Our Bearings Guarantee is withdrawn unless TULC (grease) 2 VH, manufactured by The Universal Lubricating Co., Cleveland, O., is used exclusively to lubricate the ball bearings of this machine. These instructions are issued as the result of elaborate scientific tests and practical experience for the past year. Bearings now packed with TULC.

THE UNIVERSAL LUBRICATING CO.
Schofield Building CLEVELAND, O.

UNION SPRING & MFG. CO.

SPRINGS
Coil and Elliptic
M. C. B. Pressed Steel Journal Box Lids

General Office: First Nat'l Bank Bldg.
PITTSBURGH, PA.
Works: New Kensington, Pa.

50 Church St., New York. 1204 Fisher Bldg., Chicago, Ill.
Missouri Trust Bldg., St. Louis, Mo.

The Baldwin Locomotive Works

Philadelphia, Pa.

ELECTRIC MOTOR and TRAILER TRUCKS

Wheel Condition No. 2

When the Flange and outer portion of tread need truing use this style of

Pat. May 31, 1898; Sept. 1, 1903; Aug. 2, 1904; Dec. 29, 1908; June 15, 1909; April 21, 1914.

Wheel Truing Brake Shoe

You need not keep a crew of men for wheel removal and machines for wheel truing if you use our wheel Truing Shoes.

Wheel Truing Brake Shoe Co.
Detroit Michigan

SEARCHLIGHT SECTION

FOR SALE

2—28′ 10″ Paywithin Cars, 4 G.E. 80 motors, Brill 27 G Trucks, AA1 Air Brakes.
1—Double Truck Sprinkling Car, 4,000 gallons capacity.
30—Brill 20′ Closed Cars, G.E. 1000 M., Brill 21-E Tr.
20—Jones 20′ Closed Cars, G.E. 52 Motors, Bemis Trucks.
2—Jackson and Sharp 18′ Car Bodies.
10—42′ Kuhlman Int. Cars, Bald. Tr., 4 Wgh. 121 Motors.
20—Comb. Int. Cars, Bald. Trucks, 4 Wgh. 119 Motors.
8—Brill 22′ Closed Cars, Wgh. 68 Motors, Peck. Trucks.
1—Jackson and Sharp 18′ Car Body.
4—Brill 30′ Express Cars, Brill 22-E Trucks.
9—Brill 30′ Express Cars, complete, 4 G.E. 1000 Motors, AA1 Air Brakes, Brill 27-G Trucks.
10—Wason 10 B. Open Cars, G.E. 1000 Motors, Bemis Tr.
5—Brill 10 B. Open Cars, West 12A M., Brill 21-E Trucks.
8—Brill 14 B. Open Cars, Wgh. 56 Motors, Brill 22-E Tr.
8—West. 101B-2 Railway Motors, complete.
40—G.E. 90 Railway Motors, complete.
20—G.E. 66 Railway Motors, complete.
103—G.E. 88-B brand new Motors, complete.
12—G.E. 73 Railway Motors, complete.
24—G.E. 87 Railway Motors, complete.
20—G.E. 57 Railway Motors, complete.
20—G.E. 80 Railway Motors, complete.
12—G.E. 54 Railway Motors, complete.
60—G.E. 1000 Railway Motors, complete.
60—G.E. 800 Railway Motors, complete.
30—West. 12A Railway Motors, complete.
32—West. 49 Railway Motors, complete.
8—West. 38B Railway Motors, complete.
10—West. 112 Railway Motors, complete.
4—West. 68-C Railway Motors, complete.
4—West. 68 Railway Motors, complete.
22—G.E. 80 Armatures, brand new.
2—G.E. 87 Armatures, brand new.
2—G.E. 73-C Armatures, brand new.
4—G.E. 67 Armatures, brand new.
18—G.E. 57 Armatures (second-hand), two turn.
30—G.E. 57 Form A Motor Casings.
3—West. 101-B2 Armatures, brand new.
3—West. 93A-2 Armatures, brand new.
3—West. 93A Armatures, brand new.
22—K6 Controllers. 62—K10 Controllers.
44—K11 Controllers. 30—K14 Controllers.
28—K2 Controllers. 28—B29 Controllers.
2—Sets Brill 27G Trucks, 4′ 6″ wheelbase.
6—Brill 21E Trucks, 7′ 6″ and 8′ wheelbase.
10—Dupont Trucks, 7′ 6″ wheelbase.

All of the above apparatus is in first class condition for immediate service. For further particulars apply to

W. R. KERSCHNER CO., Inc., 50 Church Street NEW YORK, N. Y.

MACGOVERN AND COMPANY
INC.

FRANK MACGOVERN, Pres. & Gen Mgr.

114 LIBERTY STREET NEW YORK CITY
'Phone, 3375-3376 Rector

60 CYCLE ROTARY CONVERTERS

1—300 KW. Westinghouse, 3 phase, 600 volts, D.C., 600 RPM., 500 amps., 370 volts AC., with starting motor.
1—100 KW. Gen. Elec., type TC, form A, 550 volts, 182 amps. DC., 340 volts AC., 1200 RPM.

25 CYCLE ROTARY CONVERTER

1—300 KW. Allis-Chalmers, 3 phase, 6 pole, 650 volts, 462 amps., 500 RPM.

Immediate Delivery

THIS IS OF NECESSITY ONLY A PARTIAL LIST—SEND FOR CATALOG

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL

Write for Price and Full Particulars to

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

COMPLETE ARMATURES FOR SALE

FOR ALL THE STANDARD STREET RAILWAY MOTORS

GET OUR PRICE WE CAN SAVE YOU MONEY

America's Greatest Repair Works

CLEVELAND ARMATURE WORKS, Cleveland, O.

POSITIONS WANTED

ELECTRICAL engineer, superintendent of equipment or general superintendent. Technical graduate, 13 years' experience, engineering, construction and operation. References present employers. Eastern location desired. Address Box 776, Elec. Ry. Jour.

ELECTRICAL engineer, technical graduate, 15 years' practical experience with General Electric, Westinghouse and public utility companies in engineering, construction and operation. Age 36, married; A-1 references. Box 773, Elec. Ry. Jour.

MASTER mechanic open for position. Twenty years' experience maintaining rolling equipment, interurban and local. Can handle men to advantage. A1 references. Am American, married. Address Box 774, Elec. Ry. Jour.

PURCHASING agent wants position; 32 years of age and married. Eight years' experience with one of the largest street railways in America. Can furnish first class recommendations. Box 781, Elec. Ry. Jour.

SALESMAN—Situation desired as salesman by graduate civil engineer, thirteen years' experience in all departments of electric railway work in both East and West. Three months as salesman of lubricating oil. Best references. Good worker. Box 772, Elec. Ry. Jour.

STREET railway superintendent with 22 years' practical experience wishes to make a change. Thoroughly acquainted with all branches of the work. Economical and capable manager, very successful in handling men. Box 775, Elec. Ry. Jour.

POSITIONS WANTED

TRACK foreman, roadmaster or engineer—Situation desired by graduate technical engineer experienced as foreman, inspector, chief clerk way and structures department, purchasing agent, twelve years' experience, nine with Stone & Webster; best references; hustler; salary desired $100 month. Box 769, Elec. Ry. Jour.

WANTED—A position as superintendent of track and ways or roadmaster, by a man, age 39 years, with 24 years' practical experience in all branches of steam, street and interurban railway construction and maintenance work. At present employed as roadmaster. Best of references. Desired change not compulsory. Box 777, Elec. Ry. Jour.

POSITIONS VACANT

GENERAL manager wanted to take entire charge of a gas, electric and street railway property requiring the highest grade of executive and operating ability, in a city of over 100,000 population. Replies will be considered confidential. Address "K.," care Rudolph Guenther, Inc., 25 Broad St., New York City.

AGENTS AND SALESMEN

Desires Sales Representatives

The Esterline Company, Indianapolis, Indiana, manufacturers of "Golden Glow" headlights, desires sales representatives for the States of North Carolina, South Carolina, Georgia, Florida, Eastern Tennessee and Eastern Kentucky. Exclusive proposition for salesmen handling electric railway supplies. State lines represented, references, etc. Box 780, Elec. Ry. Jour.

FOR SALE

FOR SALE CHEAP

Hewn, Heart, Cypress Trolley Cross Ties

We offer 10,000 pieces 6 x 8″ x 8′, hewn, heart, Cypress Ties, basis of 60c. per tie delivered New York City. For information address

GRESS MANUFACTURING CO.
18 Broadway, New York

New Trolley Wire Bargain

Eighteen One-Mile Reels

No. 0000 Hard Drawn Grooved Copper Trolley Wire

On Original Reels

Bought by Mistake
Low Price to Move Quick

Wire or Telephone Us

ZELNICKER
WALTER A. ZELNICKER SUPPLY COMPANY
St. Louis

RAILS, EQUIPMENT, ETC.

SEARCHLIGHT SECTION

60 Cycle, Rotary Converters

2—General Electric 1000 K.W., 600 v., 360 R.P.M., type "HC," comp. wound, 6 phase. Complete with air cooled 2300 v. trans., reactances and panels.
2—General Electric 500 K.W., 575 volt, 600 R.P.M., type "H.C." comp. wound, 6 phase. Complete with air cooled trans., 2300 v. reactances and panels.
1—300 K.W. Westinghouse, 600 volt D.C., 370 volt A.C., 600 R.P.M. with oil cooled G.E. trans. 11,000 v. primary.
1—200 K.W. Westinghouse, 600 volt D.C., 370 volt A.C., 720 R.P.M.
Also following transformers:
3—125 K.W. G.E. 2400 volts prim., 370 volts sec.
6—75 K.W. Ft. Wayne, 10,000-9000-185-370 v.
3—175 K.W. Stanley, 10,000-2300 volts.

25 Cycle, Rotary Converters

1—500 K.W. General Electric, 3 phase, 25 cycle, 600 volt D.C., 370 volt A.C., 375 R.P.M.
2—300 K.W. Genl. Elect., 3 ph., 25 cycle, 750 R.P.M., 600 volts.
1—250 K.W., Genl. Elect., 3 ph., 25 cycle, 500 R.P.M., 600 volts.
Can also furnish transformers—all voltages.

Railway Car Equipment

8—**75 H.P. Westinghouse, 112 Railway Motors,** 600 volts, newly rewound armatures, full commutators, rebuilt entirely. Will be sold fully guaranteed, upon any reasonable terms of payment.
12—**G.E. 57 Motors,** 50 H.P. Each.
16—**G.E. 67 Motors,** 40 H.P. Each.
20—**G.E. 201 Motors,** 65 H.P. Each.

Booster Set

Generator—West'gh'se 70 K.W., 350 volt, 200 amp. series wound.
Motor—West'gh'se 105 H.P., 575 volt, 950 R.P.M., type "SA" shunt wound.
Complete with coupling and panel.

ARCHER & BALDWIN, 114 Liberty Street ROOM 302 'Phone Rector 4337-4338 **New York**

SEND FOR CATALOG—JUST OUT
ENGINES—BOILERS—MOTORS—CONDENSERS—ETC.

It Would Be Almost a Miracle

if one or more of the 8,000 men who regularly receive the JOURNAL did not happen to want that used machine which you want to sell. The

Searchlight Section

brings buyers and sellers together

Copy received until Wednesday noon for publication in the issue of that week.

Manufacturing Sites for Lease with Building and Electric Power

At Boonton, New Jersey, 30 miles from Hoboken.

Twenty acres of ideal factory sites for lease in lots as desired on attractive terms. Several buildings ready for occupancy. Served by the main line of the D. L. & W. Railroad, with sidings on the property. The Rockaway River and the Morris & Essex Canal bound the property on two sides.

Electrical power available at low rates from Jersey Corporation, whose power station is located on the site. This Company already supplies power to many plants in vicinity. Labor conditions ideal. The Boonton Board of Trade will co-operate with owners to provide attractive houses for workmen and their families.

For particulars regarding these ideal manufacturing conditions, inquire of W. S. Barstow & Company, Inc., Engineers and Managers, 50 Pine Street, New York, N. Y.

Marketing Scrap

In an issue of this paper an official of a large light and railway company said:

> *"Some means of interchanging information about materials on hand would be desirable. One company might use a certain type of car or line equipment and have on hand a large supply of extra parts, which while perfectly good, would become useless, and if it were possible to interchange information with another company using the parts in question, many dollars which are now lost would be saved. Nearly everyone familiar with storeroom accounting can recall thousands of dollars which might have been saved if proper means had been adopted."*

THE Searchlight Section of the ELECTRIC RAILWAY JOURNAL offers a market place for just such an interchange of information as mentioned above. Machinery or supplies that have outlived their usefulness, or are no longer standard with one company are often just what another company requires, and if advertised in the Searchlight Section of the JOURNAL the exchange could be made at very slight cost.

Better look over your stock and send us a list of what you have on hand but for which you have no immediate use. The Searchlight Section can help you whether you are looking for a market, a man or a job.

Get your wants into the Searchlight

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Over 300 different products are here listed.

The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

Acetylene Apparatus. (See Cutting Apparatus, Oxy-Acetylene.)

Acetylene Service.
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc., The.
Searchlight Co., The.

Advertising, Street Car.
Collier, Barron G., Inc.

Air Cleaners.
Lord Mfg. Co.

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Alloys, Steel and Iron.
American Vanadium Co.
Titanium Alloy & Mfg. Co.

Anchors, Guy.
Johns-Manville Co., H. W.
Ohio Brass Co.
Track Specialties Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Anti-Climbers.
Railway Improvement Co.

Automobiles and Buses.
Brill Co., The J. G.

Axle Straighteners.
Columbia, M. W. & M. I. Co.

Axles—Car Wheel.
Brill Co., The J. G.
Cambria Steel Co.
Cincinnati Car Co.
Hadfield's, Ltd.
National Tube Co.
Niles Car & Mfg. Co.
Standard Steel Works Co.
Taylor Elec. Truck Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
American Gen'l Eng'g Co.
Columbia M. W. & M. I. Co.

Badges and Buttons.
American Railway Supply Co.
International Register Co.
Western Electric Co.
Woodman Mfg. & Sup. Co., R.

Bankers and Brokers.
Coal & Iron National Bank.
Halsey & Co., N. W.

Batteries, Dry.
Johns-Manville Co., H. W.
Stackpole Carbon Co.
Western Electric Co.

Batteries, Storage.
Electric Storage Battery Co.
Western Electric Co.

Bearings and Bearing Metals.
American General Engrg. Co.
Columbia, M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
More-Jones Brass & M. Co.
Post & Co., E. L.
Taylor Elec. Truck Co.
Westinghouse Elec. & M. Co.

Bearings, Center.
Baldwin Loco. Works.

Bearings, Oilless, Graphite, Bronze & Wooden.
Graphite Lubricating Co.

Bearings, Roller and Ball.
Railway Roller Bearing Co.

Bells and Gongs.
Brill Co., The J. G.
Electric Service Supplies Co.
National Tube Co.
Reiter, G. C.
Trolley Supply Co.
Western Electric Co.

Benders, Rail.
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Showing destruction of Levee Road caused by flood.

Upper illustration shows another section of same road after the flood.

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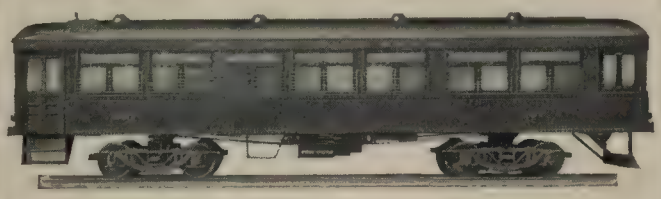

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Printing begins on Tuesday of each week.
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New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.
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BP Process Heat Treated Gears

Guaranteed to Give Three and One-Half Times the Mileage of Untreated Cast Steel Gearing

Comparative Physical Properties

Untreated Material

Tensile Strength	85000 lbs.
Elastic Limit	45000 lbs.
Elongation in 2″	22 %
Reduction of Area	45 %

Surface Hardness

Brinell Test	196

Test pieces taken from roots of teeth as shown in cut, before and after gear is treated

After BP Treatment

Tensile Strength	130000 lbs.
Elastic Limit	90000 lbs.
Elongation in 2″	12 %
Reduction of Area	35 %

Surface Hardness

Brinell Test	555

These are the results of scientifically treating ordinary medium carbon steel.

What is your cost per thousand miles for Cast Steel Gears?

Write for a definite guarantee on BP Gears.

Nuttall - - Pittsburgh

The Method of Packing a Journal

leaves an impress on the lubrication cost sheet.

If it's improperly packed the best of lubricants can never right the wrong.

By working with the car house men Galena experts get them into the habit of properly packing journals.

Then by using Galena oils the cost goes down to bed-rock.

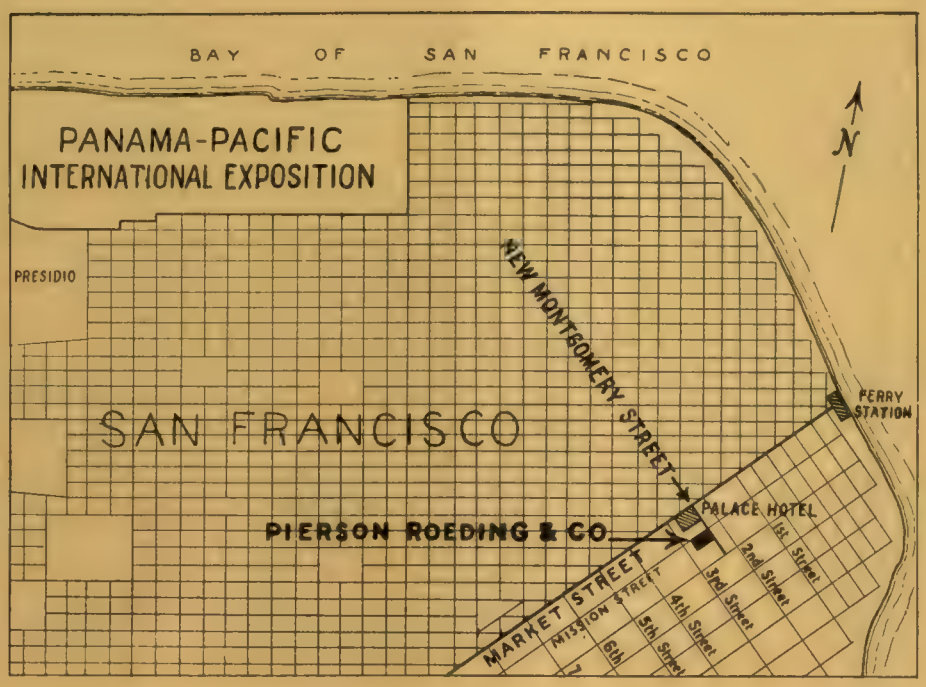
We *guarantee* the saving.

GALENA SIGNAL OIL COMPANY

Franklin, Pa.

3151

INVITATION



THIS map of the northeastern section of San Francisco shows the location of the Exposition Grounds in relation to the business district along Market Street. The well-known and conspicuous Market Street landmark, the Palace Hotel, is in the heart of the busiest part of the city and is at the corner of New Montgomery Street, where but a block east will be found the main offices of our Pacific Coast Agents, Messrs. Pierson, Roeding & Company. The offices are on the ground floor of the Rialto Building, 118-130 New Montgomery Street—corner of Mission Street. All Railway Officials from abroad and from all parts of this country who will attend the Exposition during the year, are cordially invited to visit the offices and are requested to ask for Mr. H. R. Noack, President, Mr. Thomas Finigan, Vice-President, and Mr. F. A. Richards, Manager Car Dept.

THE J. G. BRILL COMPANY
Philadelphia, Pa.
AMERICAN CAR COMPANY
St. Louis, Mo.
G. C. KUHLMAN CAR CO.
Cleveland, Ohio
WASON MANUFACTURING CO.
Springfield, Mass.
COMPAGNIE J. G. BRILL
Paris, France

AGENCIES: PIERSON, ROEDING & Co., S
Francisco, Los Angeles, Portland, Seattle. N
BROTHERS, Melbourne, Sidney, Dunedin, Br
Perth. . DUBBELMAN, 48 Rue du Lux
Brussels. SHACKLEFORD & Co., Call
201, Buenos Aires. THOMAS BA
Durban, Natal. SHEWAN, TOMES &
Canton, Shanghai. G. CHECCH
1, Milan. LONDON OFFICE, 11

63 G-E Locomotives on the New York Central

Eight years ago thirty-five 115-ton G-E Locomotives, designed to haul 535-ton trains at 60 miles per hour, were placed in service.

Today, 63 G-E Locomotives are used in this electrification. The illustration shows the latest type placed in passenger service. The total weight of 125 tons is on the driving-wheels and the locomotive can haul 1200-ton trains at 60 miles an hour.

One phase of G-E electrification progress is indicated in the above figures—an increase of 124 per cent in train weight successfully operated by locomotives weighing only 9 per cent more than the original type.

Latest type G-E Locomotive hauling "Twentieth Century" on New York Central lines.

General Electric Company

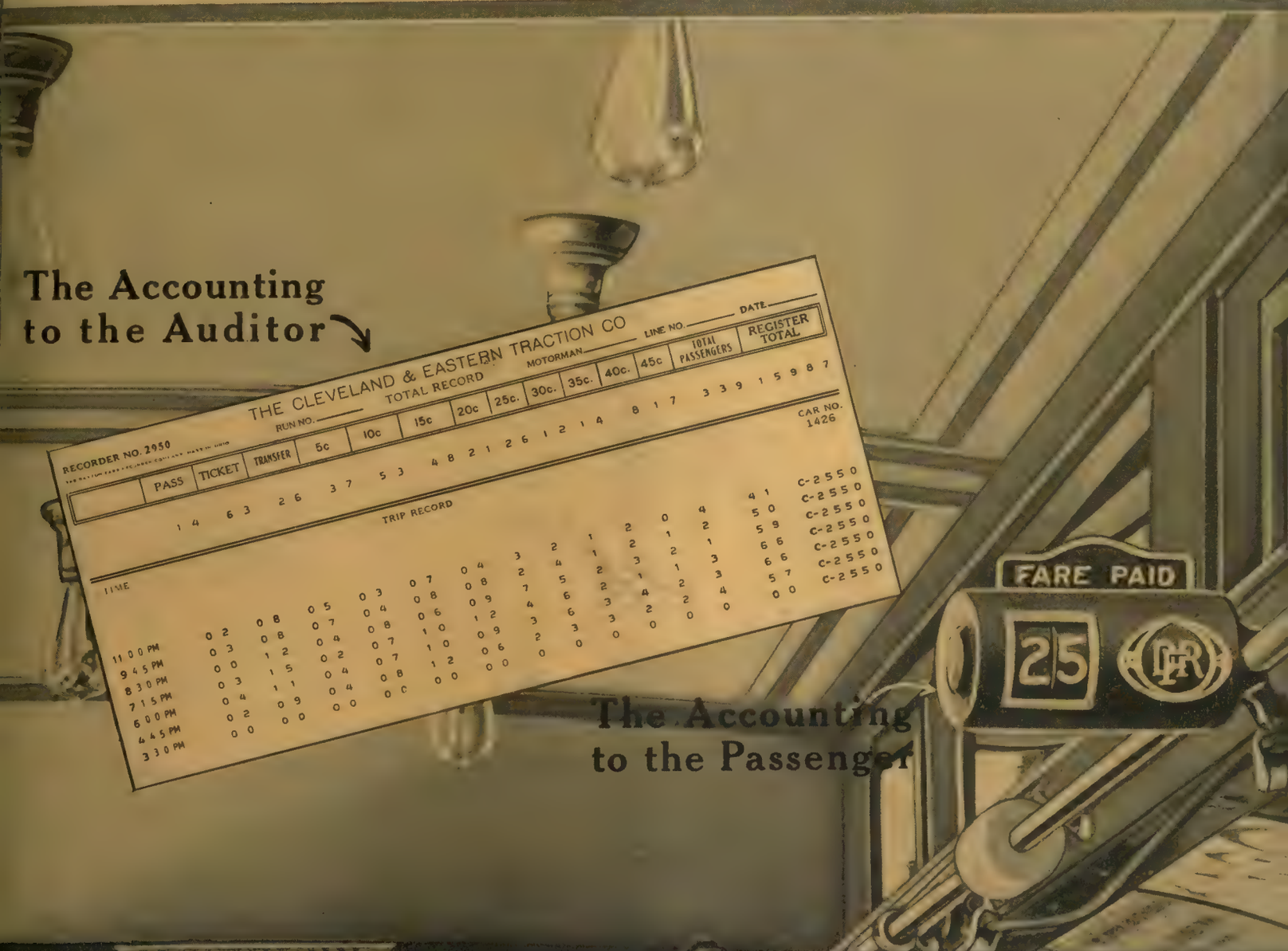
General Offices:
Schenectady, N. Y.

Sales Offices
in all large cities

ELECTRIC RAILWAY JOURNAL

Volume 46
Number 2
July 10, 1915

McGraw Publishing Co., Inc.



Results,—like facts,—*stick*,—and derogatory criticisms fall before them.

DAYTON FARE RECORDERS

get *results that have pull* with railway managers *who want to be shown and who want the best.*

Representative railway companies, long time users of multiple fare registers, have recently given their endorsement to the new Dayton Interurban Fare Recorder by placing large orders for recorder equipments following service tests that showed conclusively the superior merits of the improved recorders and fare indicators.

DAYTON FARE RECORDERS *get more fares, and correct money-losing conditions in fare handling to such an extent that every recorder becomes a source of income every day it is used,—and will pay for itself over and over again during the many years of efficient service which it is guaranteed to give.*

Write *today*, for our straight sales, lease and free-of-cost trial propositions.

The Dayton Fare Recorder Co.
Dayton, Ohio

No. 306-V

55 HP at
500 Volts
67 HP at
600 Volts

Weight
Complete
2700 lbs.

WESTINGHOUSE
ELECTRIC

The Universal Favorite

Needs no introduction—Nearly a million horsepower in use are making unparalleled service records. The most popular Railway Motor in the country.

Additional features recently added, such as pressed steel covers, effective internal ventilation, etc., make it modern in every respect.

The 306-V is a light weight, substantially built split-frame motor of ample power for heavy city and light interurban service.

We have leaflet 3833 giving details of construction. Ask our nearest office.

Westinghouse Electric & Manufacturing Co.

East Pittsburgh, Pa.

Sales Offices in all Large Cities

Electric Railway Journal

New York, July 10, 1915

Volume XLVI No. 2 Pages 47 to 88

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An account is given of the practices in economical management and good housekeeping at the Hampton shops. Some novel features are described.

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The Supreme Court of the United States says that the city under existing statutes has no power to make a contract covering rates.

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Charles M. Spofford apportions the cost between street railways and cities. Four conclusions are given upon which the determination of the proper settlement should be based.

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FRICTION

(Its relation to efficient brake control of moving trains)

FRICTION IS A RETARDING FORCE IN SOCIETY, POLITICS, BUSINESS AND RELIGION.

BUT FRICTION REPRESENTS A CURIOUS PARADOX IN THE VARIOUS FIELDS OF ENGINEERING AND MECHANICS. IT IS AT ONCE ESSENTIAL TO EFFICIENCY AND OPPOSED TO IT. PRACTICALLY ALL APPLICATIONS OF POWER DEPEND FINALLY UPON FRICTION; ALSO ALL POWER APPLICATIONS ARE SUBJECT TO SERIOUS LOSSES DUE TO FRICTION.

A RAILROAD TRAIN IS PECULIAR IN THAT WHILE ACCELERATION—THE HAULING CAPACITY OR TRACTIVE EFFORT OF THE LOCOMOTIVE—DEPENDS FUNDAMENTALLY UPON FRICTION—(WHEEL—RAIL); DECELERATION—BRAKE CONTROL OF ALL TRAIN MOVEMENT—ALSO DEPENDS FUNDAMENTALLY UPON FRICTION (WHEEL—SHOE).

ON THE ONE HAND WE HAVE HEAVY TRAINS AT HIGH SPEEDS REPRESENTING UNBELIEVABLE TOTALS OF FOOT TONS OF ENERGY; ON THE OTHER HAND WE HAVE, TO CONTROL THIS MOVING MASS, THE FRICTION OF A FEW SQUARE INCHES OF BRAKE SHOE IN CONTACT WITH A ROTATING WHEEL.

BRAKE SHOE FRICTION AND TRAIN RETARDATION RESULTING THEREFROM VARY WITH LEVERAGE. PRESSURE, TEMPERATURE, DURATION OF CONTACT, LOCATION OF BRAKE SHOE ON WHEEL, BRAKE MECHANISM DESIGN INVOLVING ABILITY TO ALTERNATE AND GRADUATE BRAKING POWER ON THE TRAIN, AND A HUNDRED OTHER FACTORS WHICH ENTER INTO THIS MOST COMPLEX AND INVOLVED BRANCH OF AIR BRAKE ENGINEERING.

AIR BRAKE ENGINEERING IS MAINLY CONCERNED WITH THE FLEXIBLE, RELIABLE AND EFFECTIVE APPLICATION OF FRICTION TO PROPERLY CONTROL ALL TRAFFIC MOVEMENT BY RAIL.

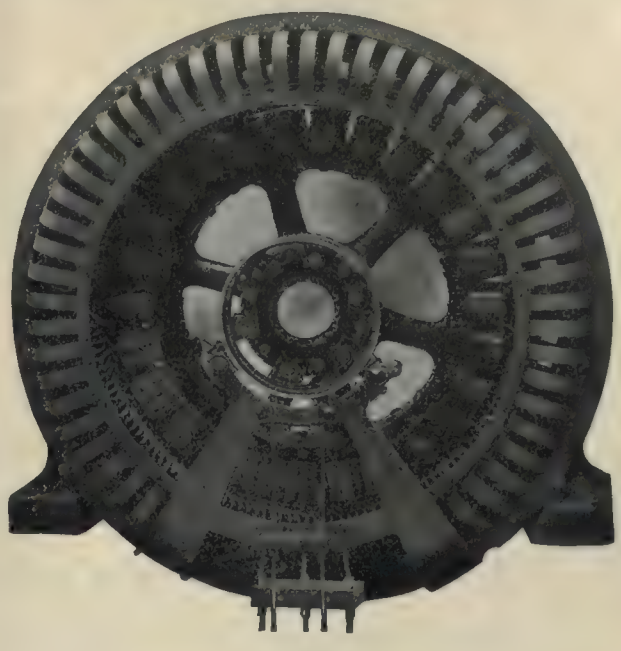
Suggested by the

Westinghouse Traction Brake Company

Works: Wilmerding, Pennsylvania

PITTSBURGH: Westinghouse Building
CHICAGO: Railway Exchange Building
NEW YORK CITY: City Investing Building
ST. LOUIS: Security Building

"The Es Have It" Link the Symbol with its meaning!



TYPE E
Alternating Current Generators

Excellency of Design, Material, Workmanship.
fficiency and Economy.
ase of Installation, Operation, Inspection.
ndurance, Freedom from Trouble.

The Type E Line of Alternators is Complete

All commercial speeds and capacities for Steam, Gas, Oil or Water Wheel (slow speed) drive. Hundreds of satisfied users give enthusiastic endorsement as to the superiority of Type E Alternators.

Established Reputation Through Faultless Operation

Full Particulars in Leaflet 2390

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Chicago, Ill.
Cincinnati, Ohio.
Cleveland, Ohio.
Columbus, Ohio.
*Dallas, Tex.
Dayton, Ohio.
Denver, Colo.
Detroit, Mich.
*El Paso, Tex.
*Houston, Tex.
Indianapolis, Ind.
Joplin, Mo.
Kansas City, Mo.
Louisville, Ky.
Los Angeles, Cal.
Memphis, Tenn.
Milwaukee, Wis.
Minneapolis, Minn.
New Orleans, La.
New York, N. Y.
Omaha, Neb.
Philadelphia, Pa.
Pittsburgh, Pa.
Portland, Oregon.
Rochester, N. Y.
St. Louis, Mo.
Salt Lake City, Utah.
San Francisco, Cal.
Seattle, Wash.
Syracuse, N. Y.
Toledo, Ohio.
Washington, D. C.
*W. E. & M. Co. of Texas.

PUBLISHER'S PAGE

Buy, Boom and Use Advertised Products Because:

1

Advertising is a Sign of Good Faith

A manufacturer of electric railway equipment who makes a statement in an advertisement has to stand back of that statement with all the resources at his command. Otherwise he will lose the confidence of the industry whose good-will is his most valuable asset.

A statement printed in an advertisement must mean what the words imply. It is not subject to the variations in meaning which can be conveyed by the voice through inflection or vocal emphasis. There can be no "hedging."

Every word in an advertisement printed in the Electric Railway Journal is subject to the critical scrutiny of sharp eyes and active minds on practically every electric railway in America. No manufacturer can afford to misrepresent a single essential before this great audience of experts.

This fact is generally recognized. Manufacturers frequently wait months, even years, before they begin to advertise a product, in order to make certain that it will be satisfactory in service. Before advertising, they can experiment on a few customers who understand the conditions, but they cannot afford to make the entire field a party to the experiment.

In short, advertisements are the result of the most careful thought, that no misinformation may be conveyed, and of the most careful investigation, that no dissatisfaction may be created.

It follows, therefore, that the products advertised in the Electric Railway Journal have been tried and found worthy, that Journal advertisers are reliable and that their statements may be taken at face value,
—that the buying of advertised products whenever possible is good business, and
—that the reading of Journal advertisements is necessary in order to keep in touch with the products offered by the most reliable manufacturers of electric railway materials.

In succeeding issues, we plan briefly to discuss the buyers' interests in connection with advertised products under headings outlined in our issue of July 3, page 6.

READ THE SERIES—APPLY IT—

Buy, Boom and Use Advertised Products

For the Good of the Service

Equally as important to the railways as the **design** of a signal is the permanence and the experience of the organization which backs the product.

Long ago the United States Electric Signal Company laid out their policy on the theory that **experience** and **conservative engineering** are of greater value to the buyer than experimentation and sales-enthusiasm.

And that is why in all announcements prepared by this company every statement can be substantiated by **facts.**

When it is stated that **United States** electric signals will do a certain thing—no discount need be placed on the assertion—they will **do it.**

It is our earnest desire to establish relations of mutual benefit with the railways.

We believe that this can be accomplished only on the basis of RELIABILITY in statement and in product.

Don't you?

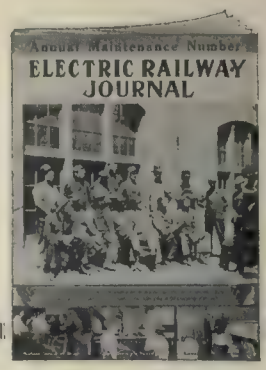
U.S. ELECTRIC SIGNAL CO. WEST NEWTON, MASS.

United States Electric Signal Co.

West Newton, Massachusetts

Foreign Representatives

Quilliam Brothers, Cleggs Court, Chapel Street, Salford, England



Your *Own*

ELECTRIC RAILWAY JOURNAL

The advantages of being a personal subscriber for the Journal are these:

You receive your own copy of the paper each week.
You have it to read when you want it and as long as you want it.
You can keep your own file of the paper for reference.

If you are **not** a regular subscriber, you probably see the Journal from time to time.

But there are times—and many of them—when you want to read the latest issue, and some one else has it.

There are many other times when you want to refer to an article in a back number, but cannot find that number.

For less than six cents a week

you can be a personal subscriber—you can get all the news of the field while it is still fresh and valuable—you can have copies when you want them.

You will never miss the subscription price, but you miss a lot of things when you do not have **your own** copy of the Journal every week.

Better send your order today before it is forgotten. Use this order form.

.....1915

ELECTRIC RAILWAY JOURNAL, 239 W. 39th St., New York.

You may send ELECTRIC RAILWAY JOURNAL beginning at once for one year to address below. I will remit subscription price of $3 within 30 days.

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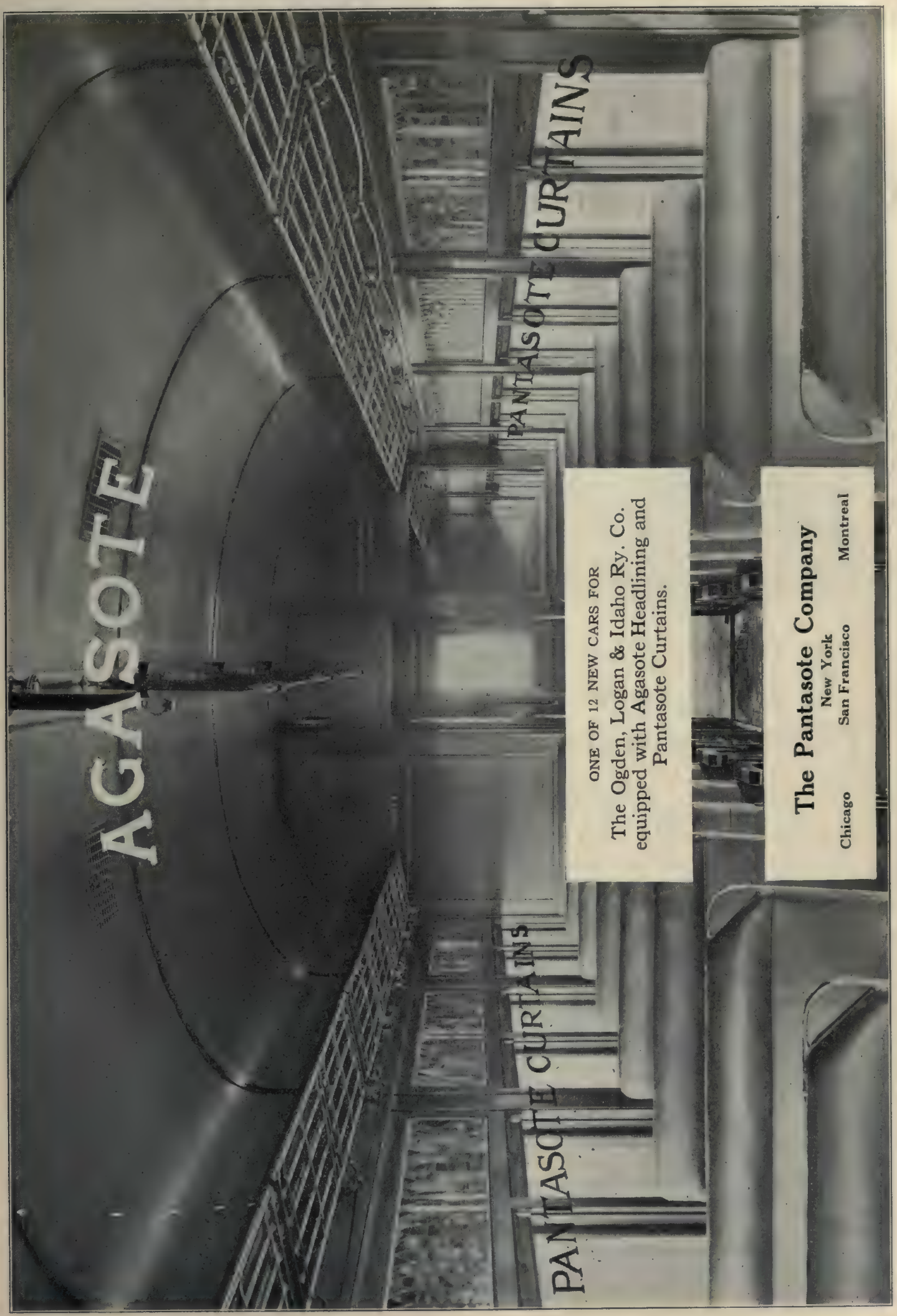
POST OFFICE .....

STREET ADDRESS .....

POSITION .....STATE.....

COMPANY .....


AGASOTE
PANTASOTE CURTAINS
PANTASOTE CURTAINS
ONE OF 12 NEW CARS FOR
The Ogden, Logan & Idaho Ry. Co.
equipped with Agasote Headlining and
Pantasote Curtains.
The Pantasote Company
New York
Chicago
San Francisco
Montreal

JOHNS-MANVILLE SERVICE
COVERS THE CONTINENT

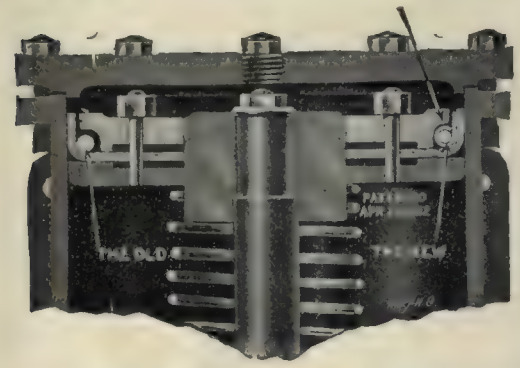
NO matter where you are located, Johns-Manville Service can reach you quickly, easily and efficiently. It is a "cover-the-continent" service.

When occasions arise due to unusual conditions, when the pressure of your needs necessitates quick action, call on Johns-Manville Service.

At a moment's notice any of our branches are ready to start the wheels of the whole organization turning to serve you.

Don't you think it's a good plan to get close to such a service? Why not now?

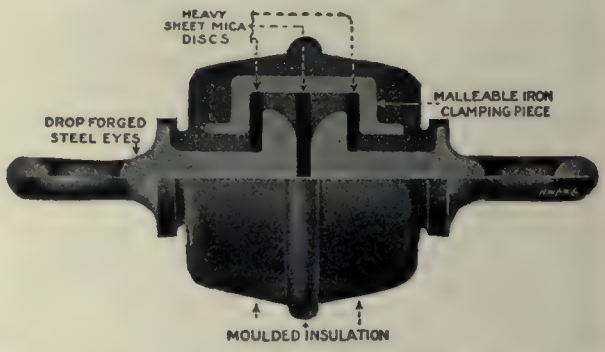
More Braking and less Breaking than ever by using J-M Air Brake Expander Ring



You can't be on every car all the time to see how the air brake performs. But you do know the cylinder packing wears out and must be renewed.

Long before the brake is worn out it has probably been "lazy," and your cars have been coasting. Maybe you can lay an accident to faulty braking, or at least you aren't playing safe. For the same money you are spending now on leather renewals you can buy J-M Expander Rings and improve the braking on all your cars. The leather will last longer, too. Safety and economy are both offered with J-M Expander Rings. Look at the cut and notice WHY the leather lasts. Then try them on your own brakes and prove it. Write nearest branch for booklet.

This is one of the many J-M Line Materials that you should know about—the Giant Strain Insulator



The two-fold function of a strain insulator has never been better balanced than in the Giant Strain Insulator line, consisting of Nos. 0, 1 and 2. They are simple from a standpoint of design and mechanically perfect for tension stresses. Probably the greatest feature of these insulators is the high dielectric and weather-proof quality of the mica compound. This material is very rugged and will not break in handling. Its ability to withstand weather conditions being best illustrated by the fact that line materials employing this compound have been giving uninterrupted and satisfactory service under all conditions of weather for the last fifteen years.

Write us for information on all J-M Line Materials.

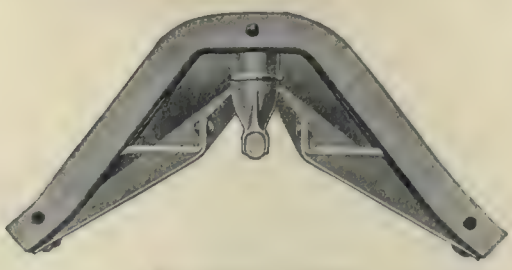
H. W. JOHNS-MANVILLE CO.

Manufacturers of Service, Subway and Transformer Boxes, Fuses, Line Material, Insulating Materials, Fibre Conduit, Fireproof Wood, Friction Tapes, Dry Batteries, Lighting Systems, Etc.

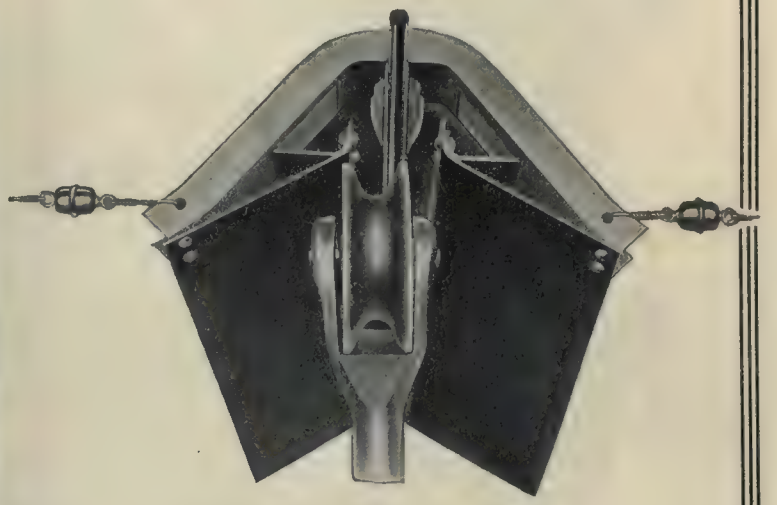
Akron	Boston	Columbus	Duluth	Kansas City	Minneapolis	Philadelphia	St. Paul	Toledo
Albany	Buffalo	Dallas	Galveston	Los Angeles	Newark	Pittsburgh	Salt Lake City	Washington
Atlanta	Chicago	Dayton	Houghton	Louisville	New Orleans	Portland	San Francisco	Wilkes-Barre
Baltimore	Cincinnati	Denver	Houston	Memphis	New York	Rochester	Seattle	Youngstown
Birmingham	Cleveland	Detroit	Indianapolis	Milwaukee	Omaha	St. Louis	Syracuse	

THE CANADIAN H. W. JOHNS-MANVILLE CO., LTD., Toronto, Winnipeg, Montreal, Vancouver

Typical Installation of Automatic Trolley Guard



End View of Guard



"It Puts the Wheel on the Wire"

Protect Your Grade Crossings with Automatic Trolley Guard

How about that railroad crossing? Your motorman probably takes a chance in beating a rapidly approaching train across; he has just time enough—**but the trolley leaves the wire.** The car is dead. This is when a second may cause or avert a collision. And this is why you need

Automatic Trolley Guard

Put it on every grade crossing on your system. Put it there to do just one principal thing —to keep the trolley wheel on the wire while a car is passing over a grade crossing or through some other danger zone.

It will keep the wheel on the wire; if it should leave the wire, Automatic Trolley Guard will put it back. Its use will mean safety in fullest measure for you.

Look at its construction—see how simple it is. Two sheet steel contact surfaces, aluminum electroplated, affixed to pressed steel yokes form the guard proper. It cannot choke up from the combination of ice, dirt, soot, etc. The wide vent at the top gives free passage to locomotive gases, while the aluminum plated sheet steel renders it impervious to the action of either these gases or the elements.

Strong, rigid, effective, durable, cheap—this is the Automatic Guard.

That you may **prove** these claims, an eight foot section will be sent you for trial. Why not go into the matter **now, now** while you yet have time?

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Sts.

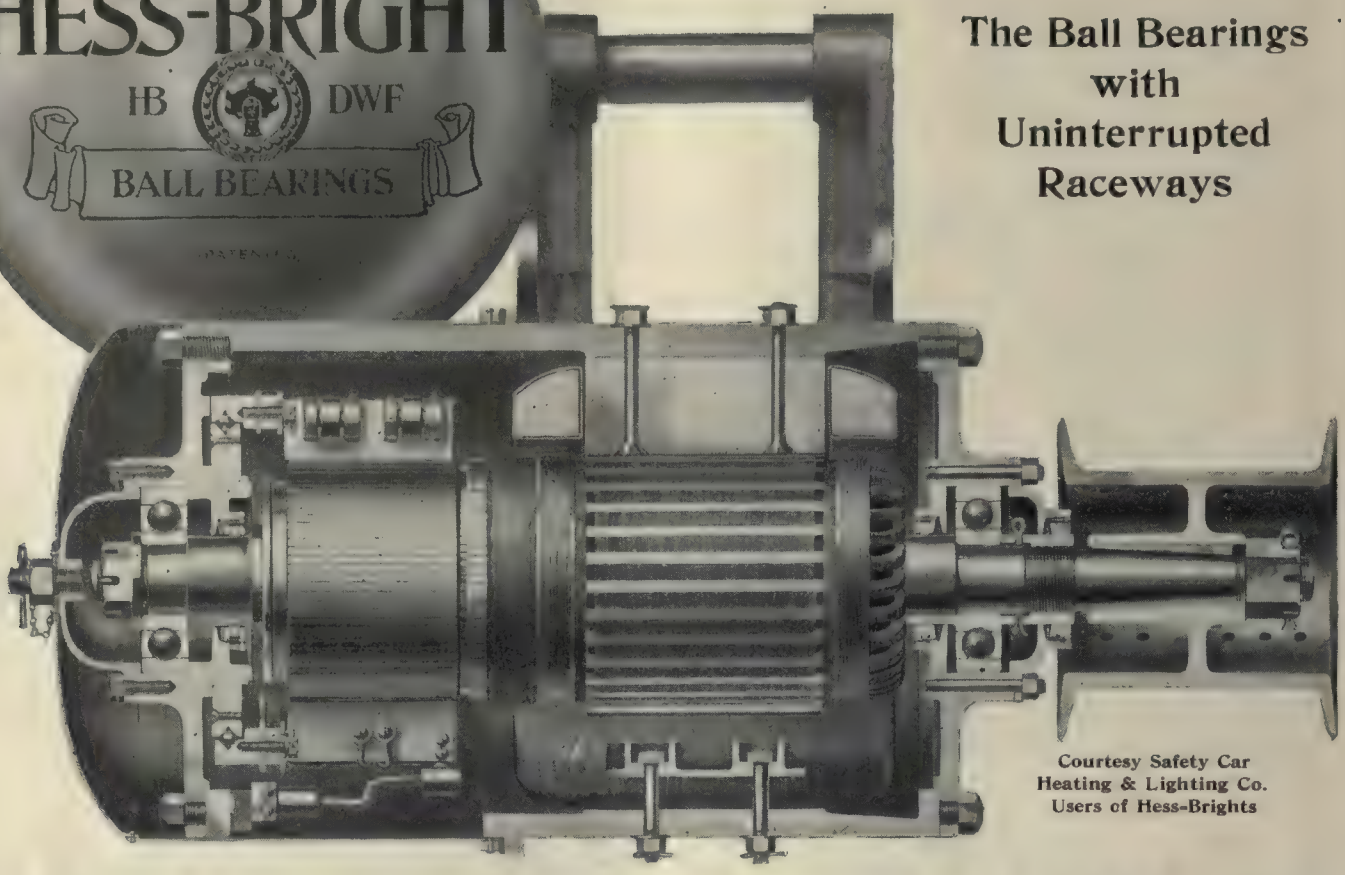
NEW YORK
Hudson Terminal

CHICAGO
417 So. Dearborn St.

HB DWF

HESS-BRIGHT
HB DWF
BALL BEARINGS

The Ball Bearings with Uninterrupted Raceways



Courtesy Safety Car Heating & Lighting Co. Users of Hess-Brights

Judge Them by Their Work

in Axle Lighting Generators for Example

This is a good test for ball bearings. The small clearances, the unfavorable location of the machine, the poor working conditions and the reliability required are all against the bearings. Yet Hess-Brights are giving satisfaction on some 3000 such machines. They have eliminated the cutting of bearings, the waste of oil, the damaged armatures and other troubles that are inseparable from plain bearings.

The same satisfactory service always follows the use of Hess-Brights — the ball bearings with the uninterrupted raceways.

There are Hess-Brights correctly designed and made for every service. Use them in your power plant, in your shops, on your cars.

Even though you don't use axle-lighting generators

Write for this Special Publication

which shows what Hess-Brights have done under unusually adverse conditions.

THE HESS-BRIGHT MAN'F'G CO.

Front St. and Erie Ave., PHILA., PA.

HB DWF

On the Coast Make Your Headquarters

at the exhibit of the

St. Louis Car Company in the Palace of Transportation of the Panama-Pacific Exposition

When you call to memory the electric cars, models of their day, built back in '87 by the St. Louis Car Co., you will realize the vast strides made in the art of car building so evidenced in the present day exhibit of this Company.

Cars and Car Parts

ST. LOUIS CAR COMPANY, St. Louis

Electric and Steam Railway Coaches, Steel Cars, Trucks and Journal Bearings, Curtains, Seats, Rattan, Bronze Trimmings, Miscellaneous Car Supplies.

Eastern Representative:
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61 Broadway, NEW YORK

Pacific Coast Representative:
GUS KOCH
797 Monadnock Bldg., SAN FRANCISCO

No Cross-overs No Re-routing

The easy derail feature of the "RECIPROCATING TRACK GRINDER" enables your men to do city grinding day and night.

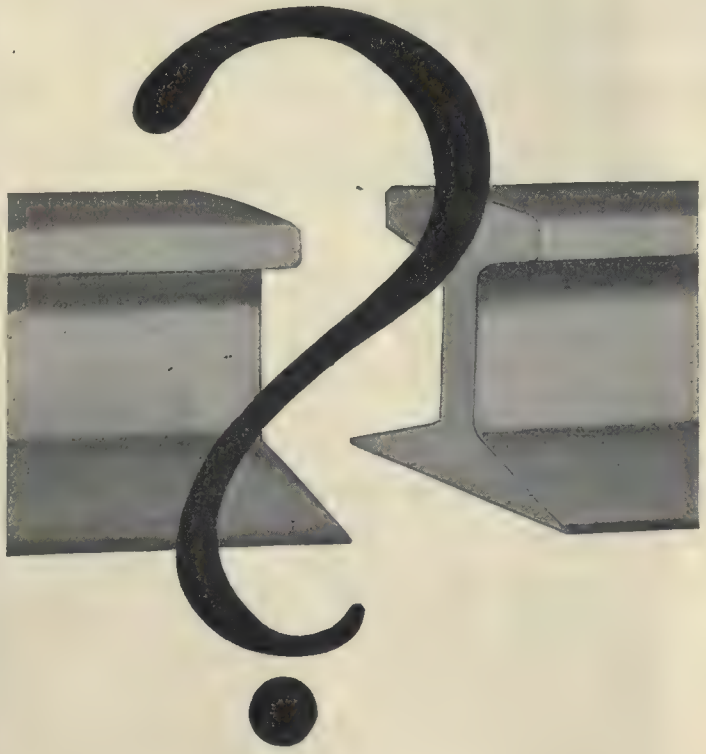
The men in this particular photo averaged 300 ft. per day, at a cost of two cents per foot.

Convenient AND economical.

Write for data.

Railway Track-work Company

Heed Bldg.
Philadelphia



Which Shall It Be?

Corroding or Non-corroding Rail Bonds.

Electric Weld Bonds do not corrode at the terminals.

The Electric Railway Improvement Co.

Cleveland, Ohio

Economical Construction

Diamond Tapered Steel Poles

are economical in first cost and also give the economy of permanent construction.
They are built of two tapering troughs, giving the finished pole a square cross-section like the trade-mark cut.
This construction gives the greatest strength with the least possible weight.

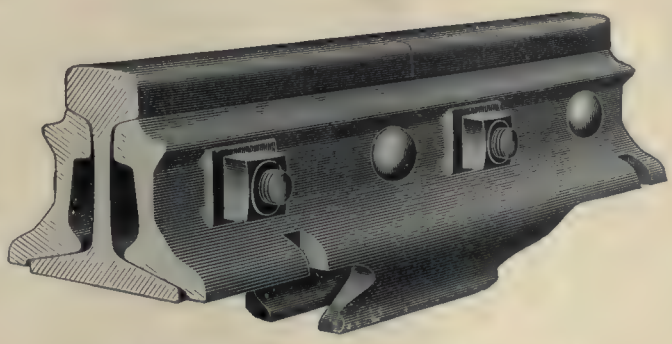
The poles, while flexible under heavy stresses, do not take a permanent set.
Joints are longitudinal to conserve the full strength of the metal and are watertight.
You will find Diamond Tapered Steel Poles decidedly economical.
Write us for data.

Diamond Steel Pole Co., Philadelphia, Pa.

3221

The Rail Joint Company
185 Madison Avenue
New York

ROLLED FROM BEST QUALITY STEEL



ONE HUNDRED PER CENT. RAIL JOINT

AGENCIES

Boston, Mass.....India Bldg.
Chicago, Ill..Railway Exchange Bldg.
Denver, Colo.....Equitable Bldg.
Philadelphia, Pa.Pennsylvania Bldg.
Pittsburgh, Pa.....Oliver Bldg.
Portland, Ore.....Wilcox Bldg.
St. Louis, Mo.,
Commonwealth Trust Bldg.
Troy, N. Y.....Burden Avenue

Montreal, Can.....McGill Bldg.

London, E. C., Eng.,
36 New Broad St.

Makers also of BASE-SUPPORTED RAIL JOINTS of CONTINUOUS, WEBER and WOLHAUPTER TYPE for Standard, Girder and Special Rail Sections. Also Joints for Frogs and Switches; Insulated Rail Joints and Step or Compromise Rail Joints

PATENTED IN UNITED STATES AND CANADA

4

That Once-a-Year Sales

—Electric Railway Journal'

will be publishe

THE American Electric Railway Associations' Convention will open at San Francisco on October 4. This means that from September 18 to October 4 every electric railway man will have ample opportunity to read up on Western Electric Railway Practice, the topic of this year's Convention Number. For months, Electric Railway Journal has had editorial representatives busy on the coast, gathering material for these articles and securing signed contributions by the men who have contributed largely to the development of the electric railways of the west. For those who do not visit the Convention or the Exposition, the Electric Railway Journal's Annual Convention Number will bring, as nearly as possible, all the data that could be gleaned on a Western trip—and a good deal of matter that would ordinarily be missed by visitors with only a week or two to spend on the coast.

What Electric Railway Men Say About the Annual Convention Number

Gen. Mgr. Illinois Road:

"We keep the Convention Number and have it bound with the regular issues for permanent reference.
"We also consider the advertising pages a valuable adjunct, and on the whole believe that if you were apprehensive as to the worth of the Convention numbers your fears would be groundless."

Gen. Mgr. Canadian Road:

"The Convention Number has been placed in our file after having been passed around among all of the officials, who have all spoken in the highest terms of it. I consider it of great value, and have kept it for reference."

Supt. Shops, Mass. Road:

"I found it of value, and it has been kept for reference. It is my practice to glance through the advertising pages and read those that apply to my line of work."

Chief Elec'n California Road:

"The Convention Number was very much appreciated. It is being kept by me as a special reference book."

An Ideal Advertising Medium

The advertising pages of past Convention Numbers have always been so nearly representative of all that is desirable in electric railway materials, that the advertising section has become a *buyer's guide* that is extensively used from one end of the year to the other.

Practically all of the prominent manufacturers who cater to the electric railway field have made it regular practice for years to use full pages, double pages and even larger announcements in this issue. This is a clear indication that they find the investment profitable.

Indications now point to an even wider use of space in this year's issue. *Appreciation of the value of the Annual Convention Number as an advertising medium is increasing each year.*

This is a natural result of the fact that the Convention Number is not an artificially produced so-called "Special Issue." On the contrary, it has become a regular event of importance in the electric railway year—for over thirty years a part of the annual convention activities—expected, welcomed, used and preserved by electric railway men throughout the world as an authoritative symposium on the most important subjects of the time.

This year the advantage of advertising in its pages is greater than ever before because there will be no exhibits at the American Electric Railway Associations' Convention. The only exhibits to be seen will be those at the Panama-Pacific Exposition. The advertising pages of the Annual Convention Number, therefore, will take the place of the usual exhibits. These pages will be the best opportunity available for showing what you wish to sell and for saying what you wish to tell.

Manufacturers who have exhibits at the Panama-Pacific Exposition should use big space in the Annual Convention Number to attract visitors to their booths, while those who have no booths can illustrate and describe their products in the Convention Number. As in the past, the advertising pages will be classified in sections, set off by section covers.

Electric Railway Journal, 239

[MEMBER AUDIT BUREAU OF CIRCULATIONS]

—Promoting Opportunity

Annual Convention Number
eptember Eighteenth

EVERY operating electric railway in the United States (executives and leading department heads) will receive one or more copies of this issue. **An edition of 9000 copies will be circulated.** The fact that it will be received by every regular subscriber to the Electric Railway Journal insures its receipt on over 98% of the total mileage of the field. The small percentage of mileage not reached through regular subscriptions will be covered by special circulation. Thus, from 1 to 100 copies will be received and preserved on **every** operating electric railway in the United States. There will be an equally thorough circulation among roads under construction—those that are nearing the stage at which equipment and supplies will be bought. Electric Railways in Canada, South America and elsewhere abroad also will be thoroughly reached by the circulation of this most important electric railway publication of the year.

A Discount for Promptness

In order to make it worth while for advertisers to send in their copy and cuts early so that there will be ample time properly to set advertisements, classify them and submit proofs, a discount of five per cent. will be allowed to advertisers who have their copy and cuts in our hands prior to

August 1st

We are willing to work overtime and use every bit of energy in our organization to give every advertiser the best composition and the best position we can give, whether his copy comes late or early, but there are only twenty-four hours in a day and we can give him better attention, better composition, better position and allow him more time to look over his proofs if we have his copy and cuts before the last week's rush is upon us.

Send Your Reservation for Space AT ONCE

and follow that by copy and cuts as quickly as you can. If you want

Free Help in Writing Your Advertisement

please tell us immediately, giving us an idea of what products you want to feature and, if necessary, what idea you want to emphasize. On receipt of this information, we shall gladly have our Service Department prepare a suggestion to be submitted for your approval.

The work will be done by a technically trained advertisement writer who is familiar with electric railway practice, and no charge will be made for this work except for special drawings of engravings that may be needed after you approve the copy and ordered its insertion. Write *today*.

West 39th Street, New York

What Electric Railway Men Say About the Annual Convention Number

Claim Agent N. Y. Road:

"I have a copy on my desk at my home for reference and I also have the office copy here on my desk. I try to keep in touch with the new devices for safety in operation.

"I know that our Assistant General Manager and Chief Engineer and Purchasing Agent each have a copy to refer to because I have seen them do it."

Pur. Agt. Texas Road:

"Your annual Convention Number, which is now in my files, I find to be very beneficial as a complete material index, and I am continually using your advertising sheets when I make application for quotations on material shown therein."

Supt. Kansas Road:

"It has been my practice for several years to save the Convention Number of the Electric Railway Journal, as I find it contains many articles of live interest and advertising matter which is of great value in the purchasing department."

Mgr. Texas Road:

"The advertising section of the Convention Number is in itself a complete purchasing guide."

We'll Excavate Your Track Trench Cheaper and Quicker Than Your Road Gang Can Do It!

The savings will amply warrant your securing the

Above View Shows
Excavating completed trench for street railway track. Loading earth into dump wagons.

View at Left Shows
Excavator working on street railway track. Trench ready for ties and ballast.

General Engineering & Construction Company's TRENCHING SERVICE

We are the sole owners of the Special Trenching Excavating Machine illustrated above, which is especially adaptable for Street Railway Track Excavation.
We operate these Trenching Machines under contract, charging the road by the lineal foot of trench excavated. Our price includes all expenses for freight, operation, etc. The speed and savings over gang methods with hand shovelers, confusion of teams and loss of time will prove a revelation to you Electric Railway Managers if you will investigate it. WE COMPLETE THE TRENCH IN ONE OPERATION READY FOR TIES, TRACK AND BALLAST.
Write us, we will be pleased to quote you on your present or future requirements.

General Engineering & Construction Co., Rockford, Ill.

CARNEGIE STEEL COMPANY

General Offices—Pittsburgh, Pa.

STEEL TIES

We manufacture steel cross ties and fastenings suitable for every kind of service.

Our heavy sections are used by steam and traction roads under most exacting conditions.

Our lighter sections are especially adapted for use in mine and portable track.

When you are in the market let us figure with you on your requirements.

DISTRICT SALES OFFICES:

Birmingham, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Detroit, New Orleans, New York, Pittsburgh, St. Louis, St. Paul, Denver, Philadelphia

United States Steel Products Company—Pacific Coast Departments:
Los Angeles, San Francisco, Portland, Seattle

Export Representatives:
United States Steel Products Company, New York, N. Y.

COLLIER SERVICE
YOU
are cordially
INVITED
to INSPECT
our
NEW
CENTRAL
PLANT
CANDLER
BUILDING
220 W. 42nd. St.
NEW YORK CITY
CAR
ADVERTISING
ALMOST
EVERYWHERE
Barron G. Collier
INCORPORATED

G-E Armature Coils

are easy to install

G-E Armature coils for G-E motors mean a great saving of time for armature winders replacing burned out coils in railway repair shops. They insure an absolute fit, eliminating forcing coils into the slots and later shrinkage and vibration in service.

G-E coils are made of the best materials carefully selected, fully tested and assembled with the utmost care by expert workmen. They are wound on special machines from the best quality of double cotton covered copper wire. Strips of thin shellacked paper are inserted between layers which later are subjected to heat and heavy pressure in steam moulds. The shellac melts, fills all crevices and hardens, leaving the coil solid and absolutely accurate in size.

Perfect insulation is secured by double wrapping the slot portions with the best quality varnished cambric taping and by three dippings in high grade insulating compound, each dipping followed by a thorough baking. These processes make for a high quality of product appreciated by railway repair shops all over the country.

Specify G-E Armature Coils on Your Next Order

General Electric Company

General Office: Schenectady, N. Y.

ADDRESS NEAREST OFFICE

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
Boston, Mass.
Buffalo, N. Y.
Butte, Mont.
Charleston, W. Va.
Charlotte, N. C.
Chattanooga, Tenn.
Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio
Columbus, Ohio
Dayton, Ohio
Denver, Colo.
Des Moines, Iowa
Duluth, Minn.
Elmira, N. Y.
Erie, Pa.
Fort Wayne, Ind.
Hartford, Conn.
Indianapolis, Ind.
Jacksonville, Fla.
Joplin, Mo.
Kansas City, Mo.
Knoxville, Tenn.
Los Angeles, Cal.
Louisville, Ky.
Memphis, Tenn.
Milwaukee, Wis.
Minneapolis, Minn.
Nashville, Tenn.
New Haven, Conn.
New Orleans, La.
New York, N. Y.
Niagara Falls, N. Y.
Omaha, Neb.
Philadelphia, Pa.
Pittsburg, Pa.
Portland, Ore.
Providence, R. I.
Richmond, Va.
Rochester, N. Y.
St. Louis, Mo.
Salt Lake City, Utah
San Francisco, Cal.
Schenectady, N. Y.
Seattle, Wash.
Spokane, Wash.
Springfield, Mass.
Syracuse, N. Y.
Toledo, Ohio
Washington, D. C.
Youngstown, Ohio

For Michigan Business refer to General Electric Company of Michigan, Detroit.
For Texas, Oklahoma and Arizona business refer to Southwest General Electric Company (formerly Hobson Electric Co.), Dallas, El Paso, Houston and Oklahoma City. For Canadian business refer to Canadian General Electric Company, Ltd., Toronto, Ont.

4509

Electric Railway Journal

Published by the McGraw Publishing Company, Inc.

Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLVI NEW YORK, SATURDAY JULY 10, 1915 No. 2

LOSING TIME IN TERMINALS

On many large railroad systems it is often most difficult for a company to avoid losing time in terminal approaches, on account of the magnitude of traffic, with its great diversity of origin concentrated upon a limited trackage. In interurban electric railway practice, street traffic often reduces schedule speed unduly in the last stages of a journey, but this also cannot be helped in a good many instances. What can be helped, however, is unnecessary delay in entering terminals in smaller places where ample room in the streets is available, or where the trackage conditions are favorable to good service. Sometimes the construction of a short section of double track in a terminal city of moderate size is of great value in enabling in-bound and out-bound interurban cars to make fast time without waiting to pass slow-moving locals, whether the latter are on or off schedule. Again, by avoiding stops considerably in advance of the destination to read registers, adjust running boards or other details which may better be handled at the end of the route, time may be clipped off the total run, with the resulting improvement in the schedule.

JUDGING HUMAN NATURE IN LEGAL DEPARTMENT

In a paper at the Pacific Claim Agents' Association, reported in the last issue, C. F. Young, adjuster Puget Sound Traction, Light & Power Company, emphasized the necessity on the part of the claim investigator of ability to combine tact with firmness. The same principle applies very appropriately to another field of the legal department, that of the attorney engaged in hastening the vacating by owners of property legally condemned for a new right-of-way. The necessity for handling different types of people in totally different manners was shown recently by a certain lawyer's personal experience in such work in an important Eastern city. With some owners a polite explanation of the situation which legalized the condemnation of property was sufficient to carry conviction of the railway company's authority to take possession and honesty of intention to settle fairly, but with the more ignorant landowners it was found that a tone of politeness was often mistaken for suavity as a veil for unscrupulous motives. Continued politeness only served to excite their suspicions, and cause them to classify the attorney and his company among the members of the Jack Sheppard Club. Experience taught that an answer of unmistakable sternness to such resentful utterances had the effect of immediately quieting both the objections and suspicions of the property owners. Severity and firmness in this case encouraged respect and thus saved much time that otherwise would have been wasted in unnecessary wrangling. The firm grasp took the sting out of the nettle.

MINIMUM CAR WEIGHTS FOR CLASP BRAKES

The report on clasp brakes made by a Master Car Builders' committee some weeks ago at Atlantic City constituted a very satisfactory indorsement of the device on the basis of experience obtained to date. There was, however, one feature of the report that serves also as an excellent argument for the use of the semicircular brass, at least by electric railways, in preference to the clasp brake as a means for eliminating the hot boxes due to journals that shift out from beneath their brasses under emergency applications. This was the establishment by the committee of a minimum car weight for clasp brakes, it being recommended only that cars weighing more than 96,000 lb. should be provided with them, and as there are very few electric railway cars whose weights even approach this figure the average interurban car, on the M.C.B. basis, would seem to be exempt from the necessity for clasp brakes. Undoubtedly, the establishment of this minimum weight was on the grounds of expense, the limit of 12,000 lb. per wheel being set by the prohibitive pressures per shoe involved with standard rigging for the higher wheel loads rather than by any doubt in the value of the clasp brake for lighter cars. Of course, it has been demonstrated that the shifting of journals depends upon the percentage of braking pressure and not upon the actual weight on the wheel, and if clasp brakes are going to be considered too expensive for ordinary cars the only apparent alternative is the use of the semicircular brass if the journals are to be kept in place.

RIVETING WITH STEEL PRESSINGS

An objection to steel pressings as opposed to castings has recently been raised on the ground of the necessity for riveting on lugs, fixtures and the like instead of having them cast integral with the original piece. Apparently the major part of the complaint is based on experience with riveted joints that have worked loose, and it cannot be denied that this has been far from uncommon in electric railway work in the past. It is also true, however, that much of the riveting work that is done in electric railway repair shops is by no means up to the best standards, and it is hardly proper to condemn the process in general because of failures that could undoubtedly have been avoided by proper care in fabrication. Riveting, when properly done, is infinitely superior to any other method of making up

a joint, and so far as reliability in attaching lugs is concerned it gives results quite as good as those obtained by pouring the projections solid on a steel casting and better than those obtained when cast iron is used. As compared with welding the riveted joint is distinctly preferable because it can be separated and remade at the expense only of cutting off the rivet heads and redriving them as desired, yet when once in place the strength of the construction is definitely known and does not depend, as does the weld, upon a complicated metallurgical process and a granular structure of the affected metal that is absolutely hidden from sight. All that is required is that the riveted pieces shall be firmly clamped together and that the rivet holes shall be rough-reamed before the rivet is driven. A high grade of rivet steel and the use of pressure riveters are largely incidental. Years of experience with locomotive boilers have shown this beyond a doubt, because there the riveted attachments never give the slightest trouble notwithstanding the continuous vibration and extraordinary strains set up by the wide temperature changes.

LIBERALITY WITH COST DATA

It is a pleasure to commend the American Institute of Electrical Engineers and the railroads which co-operated for their respective enterprise and liberality which made possible the publication of data of costs of construction and operation of different types of contact systems. This was a unique feature of the Deer Park convention, one which was the cause of surprise as well as congratulation. Even assuming the necessary willingness on the part of the possessors of the valuable data, the reduction of the information to form for comparison was no light task. One writer of a paper based his conclusions on entries filling 250 foolscap pages, the figures being drawn direct from the railroad company's job records and requiring an analysis of these. Another element in the success of the program laid out by the railway committee of the institute was its definiteness. The study was confined to one part of the field, contact systems. In this restricted region attention was focused upon the particular things likely to interest and prove of value to railway men. The result speaks for itself. The lesson in it all seems to be that the old policy of hoarding cost data by railroads is on the wane. Electric railways are committed to the policy of publicity and, like charity, this should begin at home. They must serve each other as well as the public, and one effective way to do this is through the interchange of information which will lead to more economical construction and maintenance. The pocket notebook of many a master mechanic and engineer contains information whose value would be enhanced by circulation, for such circulation would stimulate others to like liberality. An example of the kind of information which is of great value to operating men was printed in the issue of the ELECTRIC RAILWAY JOURNAL for June 26, page 1214. By giving these figures the Los Angeles Railway Corporation shows a real willingness to serve. By the dissemination of such data the industry benefits, and the giver is in no wise impoverished.

CONSTRUCTING STEEL TOWER LINES

A group of papers presented at the recent A. I. E. E. convention dealt with the very important matter of the construction of tower lines. One may at the present time say that the steel tower on about 500-ft. or 600-ft. spacing has become the standard construction for high-voltage transmission lines. At first towers were very crude in design and generally erred either on the side of insufficient strength or of being made abnormally heavy in the attempt at improvement. As things stand to-day there are available steel towers which have been really designed for the purposes for which they are to be used, and the old difficulties have for the most part disappeared. Yet it is perfectly certain from the performance of tower lines that there is a good deal to be learned yet about economical design and construction. The convention papers to which we have reference deal in the main with one important and rather neglected consideration, that is, the foundations of the towers. Whether the tower itself is designed to be a rigid structure or to have a considerable degree of flexibility, as in some of the A-frame structures, the working strains come ultimately upon the foundation.

It is not difficult to design beforehand a tower sufficiently strong to stand the maximum stresses imposed upon it without buckling. This does not, however, insure it against tipping over or against being forced into a position where the added load may cause actual failure. The tower is meant to do its work when standing erect and in its normal position, and if pulled out of it through lack of foundations it may absolutely tip over or be twisted out of shape. The foundation work consists essentially in bolting the base of the tower to anchors of one sort or another sufficiently embedded in the ground to resist the turning moment of the base. In the papers before us two forms of foundation are chiefly considered: Steel anchors, usually of tripod form, so embedded that they will not pull out, and concrete masses of the general form of an inverted mushroom with embedded bolts or angle irons to which the steel structure is secured. As between these two types the choice seems to be chiefly based on the local conditions. Either can be made adequately strong to hold up the tower under all practical conditions. It has been actually shown that in some cases one form is cheaper and in other cases the other, each in its own situation being adequately strong. On the lines of the Pennsylvania Water & Power Company it was found that the mushroom concrete foundation could be installed more rapidly and at lower cost than the steel used on the first tower line of the company. On lines elsewhere the reverse situation has occurred.

The moral of the discussion seems to be that with any given tower the best form of foundation must be determined for the situation in which the tower is to be used, irrespective of experience elsewhere. The nature of the ground, the cost of labor, the cost of

concrete, and transportation all play their part, and the indications are that it is wise before settling so important a question actually to try out the towers to be used under the stresses for which they are designed and with several types of foundation. The cost of such experimentation is small compared with the difference in final expenditure which can thus be determined. There seems to be no advantage in pushing such tests to the limit of breaking down the tower. It may be theoretically interesting to know whether with a given foundation the foundation itself will break or lift or the tower crumple under extraordinary stresses. The practical demand is merely whether the foundation is fully adequate to endure the stresses incurred when the tower is loaded to the designed point, with due regard to a proper factor of safety.

LINE INSULATION

Mr. Bang's institute paper on the operation of the transmission lines from the great plant on the Susquehanna into Baltimore, originally presented in Baltimore and brought up for discussion at the convention last week, brings to the front the ever-present insulation problem. The three circuits of aluminum cable which form this transmission system have apparently conditions not unfavorable to continuity of service. They are carried on steel towers provided with grounded cables for protection against lightning, are worked at a voltage which cannot be considered exceptionally high, and are supported on suspension insulators having a large factor of safety, much larger than is found on similar circuits using pin-type insulators. Nevertheless the partial or complete interruptions of service have averaged more than a score per year, and of this number the vast majority have been due to lightning, although the lines are protected not only by the ground wires but by electrolytic arresters which, on the whole, are perhaps the most satisfactory form of arresters yet produced. Lightning is, of course, a contingency to be treated as always dangerous, especially when a direct stroke falls upon the line. Generally the arresters at the ends of the line are sufficient to keep the discharge from doing damage in the station, although now and then there are failures.

The damage on the line, however, is a different matter for it is strictly local. Hence the presence of arresters somewhere else on the circuit makes very little difference so far as damage to insulators is concerned. The situation seems to have been, on the circuits which Mr. Bang studied, that a powerful lightning discharge frequently flashed up alongside the string of insulators to the tower and broke down insulation, sometimes shattering the insulator disks in a startling fashion. The following arc did the rest. With all the insulators in first-class shape the power of the series to resist the lightning flash ought to have been considerable enough to avert damage, but it frequently failed to do so. A direct lightning stroke falling upon the line has so enormous a potential that a flash-over is not at all unexpected. In the case of this line, however, it may be questioned whether some of the destructive strokes were not due to gradually lessening strength of the insulators, caused by continued use and mechanical and electrical strains. Mr. Bang's investigation of the insulators by periodical resistance tests shows a somewhat disquieting state of affairs. Normally they were in first-class condition, but about one disk in seven or eight, after several years' service, showed a very great falling off of the resistance, practically rendering the injured disk useless. This was traced to two different causes, first superficial cracks, usually on the head of the disk, apparently developed from mechanical strains internal or external, and, second, failure of insulation, again usually at the head of the disk, not through cracking, but through a slight porosity of the porcelain, the effects of which seem to be cumulative with long exposure to moisture.

The moral appears to be that in the present state of affairs it is wise to make megohm tests of insulators from time to time to see whether any of them have become unreliable. Whether a similar condition holds for the pin-type insulators, more frequently used than the suspension insulators for the comparatively moderate voltages of railway transmission, remains to be seen. The situation as regards strains is quite different in the two forms, and at the commoner voltages also comes in the difference between glass and porcelain with respect to this particular kind of deterioration. Most lines use porcelain insulators, but in a great many cases glass is an effective substitute, and the relative reliability of the two materials as respects the progressive decrease in insulation deserves attention.

The most suggestive portion of Mr. Bang's paper deals with preventive measures to avert the damage following the lightning stroke. The real mischief is done by the arc which follows a breakdown of the insulation, and two devices tried seem to have proved effective in putting this arc out of business before the insulation was permanently destroyed. Both are described as in use here, and they have seemed to give promise of filling a very important function in line protection. One is a relay device for shunting the arc with a fuse as soon as it is established, thereby killing it, and then clearing the line by the destruction of the fuse. The other drops the excitation of the machines until the arc gives out and then re-establishes the field. The former can be made to act very quickly so that there is little risk of either damage to lines or of losing synchronous load. The latter operates more slowly but appears from Mr. Bang's results to be somewhat more certain in its operation. A combination of the two as worked out on the lines under discussion seems to have been very useful in lessening the trouble from lightning since these protective devices were installed. At all events it is clear that the insulators on a high-voltage line do require more watching than mere attention to physical breaks, and that protective apparatus properly installed is of material value in preventing interruptions of service even though the lightning may start trouble.

Shop Notes from Hampton, Va.

An Account Is Given of the Practices in Economical Management and Good Housekeeping at the Hampton Shops—Some Novel Features Are Described

In a recent visit to the Hampton shops of the Newport News & Hampton Railway, Gas & Electric Company, the following practices in economical management and good housekeeping were observed:

Painter's Storage Rack of Adjustable Type

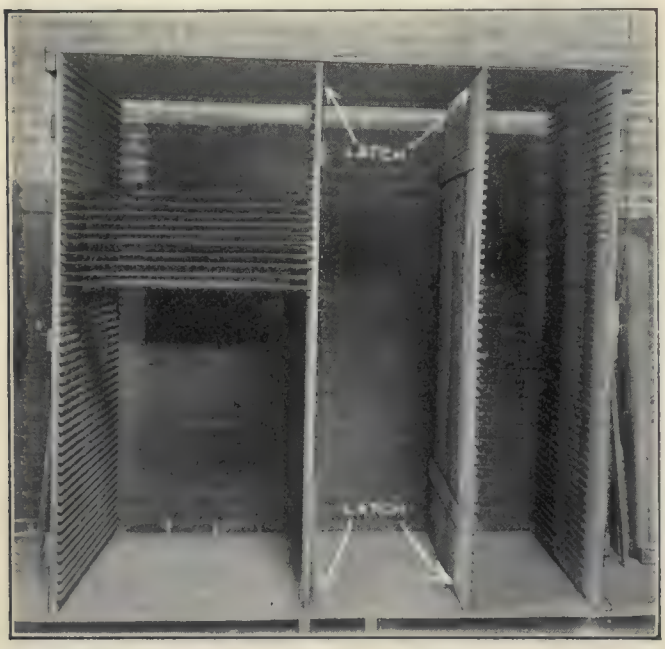
The painter's storage rack shown in an accompanying half-tone is not an absolute novelty, but its principle deserves to be more widely known than it is. So far as the horizontal placing of panels is concerned, the rack does not differ from that seen in most paint shops. However, with the aid of ordinary door latches, the vertical partitions may be moved to accommodate any width of panel. The latches are mounted vertically at the top and bottom of each partition and their tongues are merely drawn out of pockets in the top and bottom of the rack to permit the shifting of the partitions to any desired stops to the right or left.

Vertical Armature Racks

Where room is scarce vertical armature racks deserve wider use. In the accompanying illustration may be seen one for motor armatures and another for compressor armatures. The armatures are quickly handled by means of a jib crane which is attached to a corner post, a crane being used because the shop is too small to require an overhead track. Formerly the armatures were stored on a table under canvas. This led to trouble because careless workmen would throw heavy tools on the canvas, thereby damaging commutator bars which previously had been passed as perfect.

Fire Pail Suspension

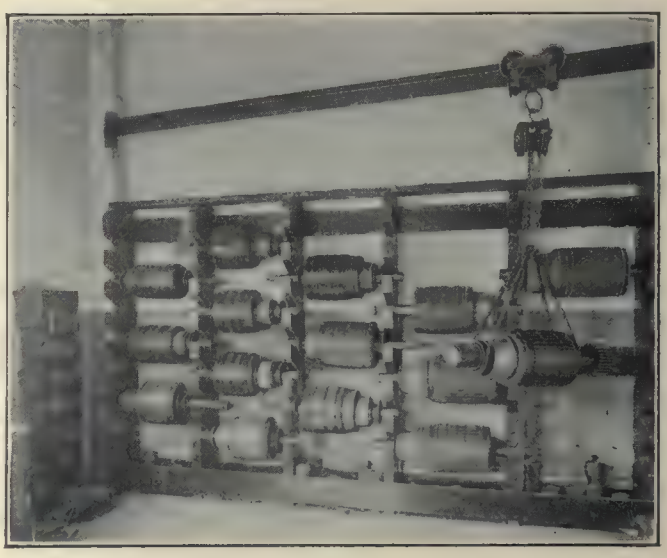
It is customary in many shops to carry the egg-bottomed fire pails through holes made for them in a solid wooden shelf. This shelf offers the shopmen a tempting place for so many odds and ends that eventually the pails themselves are lost to sight. Following a suggestion from the safety committee, all fire pails hereafter will be carried from metal brackets so that the space between and on the pails will not be cluttered up so easily. The two illustrations on the next page show one of the old wooden shelves and the other the new metal bracket.



HAMPTON SHOPS—PAINTERS' RACKS WITH MOVABLE PARTITIONS

Reclaiming Two-Point Resistors

The company has already reclaimed some fifteen sets of Westinghouse two-point resistors which had been rendered useless by the corrosion of the two-screw brass lugs or contacts. After brightening the contact surfaces of the grids the old lugs were replaced by copper washers of the type used on the latest Westinghouse resistors.



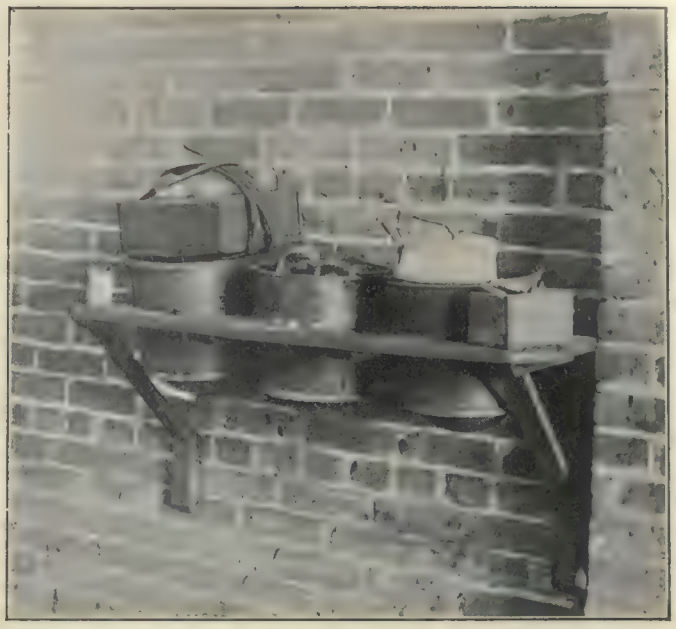
HAMPTON SHOPS—VERTICAL ARMATURE RACKS WITH JIB CRANE

Electric Arc Welder

Out of five old resistors, the abandoned rheostat of a substation voltage regulator and a circuit breaker the

HAMPTON SHOPS—HOME-MADE WELDING OUTFIT IN USE ON A MOTOR SHELL

HAMPTON SHOPS—THE SAFE AND CLEAN WAY OF SUSPENDING FIRE PAILS



HAMPTON SHOPS—THE UNSAFE AND NEGLIGENT WAY OF SUSPENDING FIRE PAILS

shopmen constructed the electric arc welder illustrated. This equipment is mounted on a truck for convenience in working outside as well as inside the shops. The welding material is mild steel in the form of 5-16-in. diameter rods, and the flux is a cheap borax compound. The welding rods are held in a plug of metal bored for the purpose. The welder's metal hood has the usual combination of ruby and green lenses. The novel feature of the hood is that its weight is comfortably carried by building it around a cap made up of an ancient, rimless derby. The cap has a leather band to which brackets from the hood are attached.

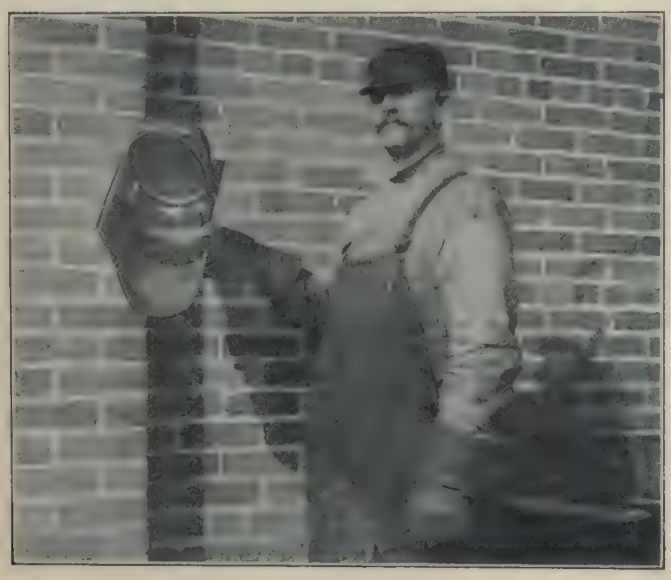
One of the first jobs to which this welder was applied was the building up of No. 27-G truck side-frame brackets. It has also been used for patching gear cases and filling keyways and it will shortly be tried for building up trackwork.

Change of Gear Ratio

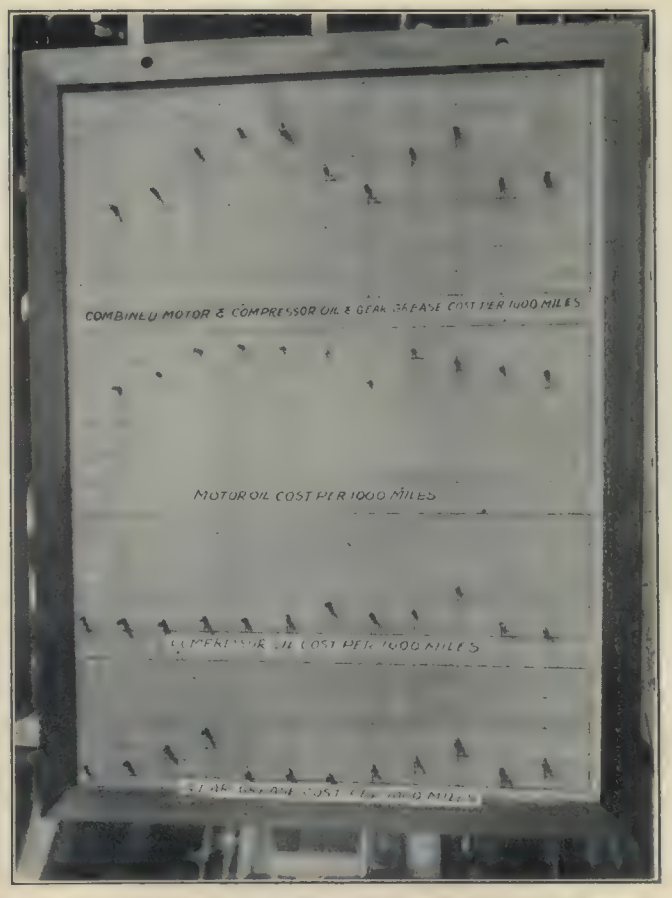
The gear ratio of many equipments was 24:58, which corresponded to a maximum speed of 35 m.p.h. A careful study of running conditions showed that the schedule could be maintained even if the maximum speed was cut to 28 m.p.h. The standard ratio is now 17:67. The saving in energy consumption has not been calculated, but there has been a very perceptible decrease in the number of baked armatures and fields. The company has also changed from bolted gears to the Cincinnati Tool Steel Gear & Pinion Company's solid gear.

Maintenance Records

Until the property was taken over in January, 1912, by Allen & Peck, Inc., with J. N. Shannahan as general



HAMPTON SHOPS—A DERBY ANCIENT OF DAYS ADAPTED TO CARRY THE VISOR WITH EASE



HAMPTON SHOPS—PEG BOARD POSTED IN SHOP TO SHOW MAINTENANCE COSTS

manager, no records of equipment life were kept, nor were the cars inspected and overhauled on a mileage basis. At present they are inspected every six days, which is approximately on a 1000-mile basis. Beginning March 15 all cars were put on an actual 1000-mile inspection basis. Mileage records are now kept showing actual service obtained from brakeshoes, wheels, trolley wheels, harps, lubricant costs, etc.

A keen desire to keep down the lubrication costs has been created by showing the men just how the cost of each item varies from month to month and how this affects the total cost. To secure this publicity a wooden frame was constructed to hold a record sheet which is ruled vertically for months and horizontally for cents per 1000 car-miles. This sheet is subdivided to show the costs of motor oil, compressor oil, gear grease, and also of these three items combined. As shopmen are not accustomed to reading graphs the points which would serve to draw each curve are represented by plugs of wood. When a year's record has been made in this way the curves will be drawn and the plugs used again to show the monthly records for the current year.

The cost of car lubrication has already been cut down from 42 cents in 1912-1913 to 24 cents per 1000 car-miles, exclusive of packing, but it is expected that during the present year the cost will be brought down to the Galena contract figure of 20 cents per 1000 car-miles. It will be difficult to drop below that figure so long as 25 per cent of the mileage is performed with such motors as the Nos. 49 and 12a. These older motors must be lubricated every day and their felt-pad lubrication through Perfection packing, while satisfactory for service, is uneconomical because of stand-by leakage. In fact, with these motors the oil consumption is almost as great when the cars are standing as when the cars are moving.

Milwaukee Fare Case Decided

Supreme Court of the United States Says That the City Under Existing Statutes Had No Power to Make a Contract Covering Rates

A short note was published on page 1226 of the issue of this paper for June 26 in regard to the decision of the Supreme Court of the United States in the Milwaukee fare case. The principal question involved in the decision was whether the city of Milwaukee had power to make a contract with the railway company covering a term of years for a specified rate of fare. The opinion, which was handed down on June 14, upholds the Wisconsin Supreme Court in denying this right.

The opinion first recites the history of this case, which was briefly as follows: On Jan. 2, 1900, there was granted by the city to The Milwaukee Electric Railway & Light Company the right to operate over certain streets. By the same ordinance all franchises expiring prior to Dec. 31, 1934, were extended to that date and all franchises which would otherwise expire subsequently to that date were made to terminate at that time. The ordinance permitted the company to charge a 5-cent fare when paid in cash but required it to sell twenty-five tickets for $1 or six tickets for 25 cents good at certain hours up to Jan. 1, 1905, and thereafter good at any time. Subsequently, at the request of the city, the Railroad Commission held hearings to determine whether the rates were too high and finally ordered the company to sell thirteen tickets for 50 cents. The company claimed that this order took its property without due process of law. The case was first tried in the State courts and the order was sustained by the Supreme Court of Wisconsin. It was then taken by the company to the United States Supreme Court as being a violation of Sec. 10 of Art. I of the Constitution of the United States and of the fourteenth amendment thereto.

In its decision the federal Supreme Court upholds the Wisconsin Supreme Court in its decision that the city had no authority to make such a contract and that the authority to establish fares remained with the State. As a basis for this conclusion it quoted Sec. 1862 of the revised statutes of Wisconsin of 1860 which reads in part as follows: "Any municipal corporation or county may grant to any such [street railway] corporation * * * the right to construct, maintain and operate street railways, the use, upon certain terms as the proper authorities shall determine, of any street, parkway or bridges * * *. Every such road shall be * * * subject to such reasonable regular rules * * * as the proper municipal authorities may by ordinance from time to time prescribe."

The opinion then says: "The fixing of rates which may be charged by public service corporations of the character here involved is a legislative function of the State, and while the right to make contracts which shall prevent the State during a given period from exercising this important power has been recognized and approved by judicial decisions, it has been uniformly held in this court that the renunciation of a sovereign right of this character must be evidenced by terms so clear and unequivocal as to permit of no doubt as to their proper construction." The principle involved is well stated, according to the court, in Home Telephone Company vs. Los Angeles, 211 U. S. 265, 273.

Continuing, the court says that the Supreme Court of Wisconsin held that Sec. 1862 quoted above gave no distinct authority to the city to contract away the legislative authority of the State to fix tolls and fares by lowering them if found to be excessive; that while the term "grant" was used, the grant was to be upon terms such as the municipal authorities might determine, and that this language was more appropriate to the exercise of power by the municipality than to the making of a contract between parties. The Supreme Court of the United States adds: "The language of the section certainly lends itself to this construction, and there is nothing in specific terms conferring the right to contract by agreement between parties, much less to make such contract during its existence exclusive of any further right of the State to act upon the subject in the exercise of its legislative authority. It authorizes the grant of the use of the streets upon such terms as the proper authorities shall determine, not upon such terms as the parties in interest shall agree to."

The Supreme Court says that the plaintiff relied upon Detroit vs. Detroit Citizens' Street Railway Company, 184 U. S. 368; Cleveland vs. Cleveland Street Railway Company, 194 U. S. 517, and Minneapolis vs. Minneapolis Street Railway Company, 215 U. S. 417, but it finds a material difference in circumstances concerned in this case and in the cases in question.

The opinion continues: "It is true that this court has repeatedly held that the discharge of the duty imposed upon it by the Constitution to make effectual the provision that no State shall pass any law impairing the obligation of a contract, requires this court to determine for itself whether there is a contract, and the extent of its binding obligation, and parties are not concluded in these respects by the determination and decisions of the courts of the States. While this is so, it has been frequently held that where a statute of a State is alleged to create or authorize a contract inviolable by subsequent legislation of the State, in determining its meaning much consideration is given to the decisions of the highest court of the State. Among other cases which have asserted this principle are: Freeport Water Company vs.

Freeport, 180 U. S. 587, and Vicksburg vs. Vicksburg Water Company, 206 U. S. 496, 509."

The court then discusses the Wisconsin decisions on this point quoted by both sides, particularly Linden Land Company vs. The Milwaukee Electric Railway & Light Company, 107 Wisconsin 493, and Manitowoc vs. Manitowoc & N. T. Company, 145 Wisconsin 13, and agrees with the Wisconsin Supreme Court in holding the latter to be controlling and that Sec. 1862 denies authority to municipal corporations to make contracts preventing the State from its further exercise of its power to fix the rates which may be charged by public service corporations.

As stated in the issue of this paper for June 26 The Milwaukee Electric Railway & Light Company now proposes to take the matter up with the lower courts, and possibly also with the Railroad Commission, on the question of the reasonableness of the original order, and hopes to win its case.

Cost of Highway Bridges*

Apportionment Between Street Railways and Cities—Four Conclusions Upon Which the Determination of the Proper Settlement Should Be Based

BY CHARLES M. SPOFFORD OF FAY, SPOFFORD & THORNDYKE, BOSTON, MASS.

The fact that trolley cars are so much heavier than other road vehicles puts street railway companies under different obligations than other users of highway bridges and makes it seem fair to assess upon them the extra expense required to provide for traffic of this character. The assessment of street railways to pay for the cost of new bridges in Massachusetts has been established by legislative enactment and has varied from a minimum of 10 per cent to a maximum of 25 per cent, the cost being determined by hearings before a commission appointed by the court.

If the structure is to be of a monumental type, it would seem that the scale of the towers, carving and other ornamental features may be a function of the width of the bridge, and if increased width is necessary to provide for street car traffic, additional expense for this purpose may legitimately be incurred.

Whether any material increase in width is necessary to provide for street car traffic depends upon the total density of the traffic. If the car service is infrequent, there would seem to be no reason for increasing the width of the bridge to provide for street cars other than by the slight amount necessary to provide safe clearance for crowded cars. Ordinary traffic can readily run on the portion of the bridge occupied by the track with little or no delay, and space for extra lines of traffic need not be provided. An example illustrating such a case is the Meridian Street Bridge of Boston, where it was agreed that the proper distance center to center of trusses would be increased only 2 ft. 6 in. by the presence of street cars, although it carries two lines of track.

Another example illustrating the same case is the Chelsea North Bridge of Boston. Provision for four lines of traffic was evidently necessary on this bridge, but it was agreed by both sides before presentation to the Apportionment Commission, that a roadway 40 ft. wide between curbs, with trusses 44 ft. center to center, was required whether street cars were operated or not, this space providing for four traffic lines. In consequence, no charge was made to the railroad for additional width.

To measure the capacity of a bridge or street in relation to traffic, it is evidently necessary to consider the character of the vehicles and their speed as well as their number. For this purpose the London Board of Trade sets up as a unit a motor cab or carriage, and assigns the following numbers to other classes of vehicles, using the unit as one.

Trade Vehicles		Passenger Vehicles	
One-horse (fast)	8	Electric trams	10
One-horse (slow)	7	Omnibuses (horse)	5
Two-horse (fast)	4	Omnibuses (motor)	3
Two-horse (slow)	10	Cabs (horse)	2
Motor (fast)	2	Cabs (motor)	1
Motor (slow)	5	Carriages (horse)	2
Barrows	6	Carriages (motor)	1
		Cycles	½

The board lays down the following definitions: "Traffic volume" is the average aggregate number of traffic units attributable to vehicles which pass a given point per minute during the twelve hours from 8 a. m. to 8 p. m. "Average traffic density" is the aggregate number of traffic units attributable to vehicles which pass the point during the twelve hours, per minute, per 10 ft. of available carriageway. "Greatest traffic density" is the average density per minute, per 10 ft. of available carriageway, during the busiest hour, expressed in traffic units. With the above units and definitions in mind, the following comparison of traffic on London bridges is clear:

	Westminster Bridge	Waterloo Bridge	Blackfriar's Bridge	London Bridge	Tower Bridge
Traffic volume	91.4	60.5	105.9	89.2	84.7
Average traffic density	20.3	22.0	14.4	24.1	24.2
Hour of greatest density	6 to 7	5 to 6	6 to 7	11 to 12	11 to 12
Density of that hour	23.8	22.5	15.3	27.4	27.9
Average vehicles	4.2	3.9	5.0	4.0	6.0

In connection with the width of bridges it should be remembered that the capacity of a bridge in vehicles per hour is considerably greater than that of the ordinary city street due to the freedom from interruption by traffic on intersecting streets and by vehicles stopping at the curb to discharge and receive freight or passengers. It is evident that the width of bridges on curves may have to be increased greatly to provide proper clearance for street cars.

The increase in strength necessary to provide for street cars is most marked in the floor systems. It is less noticeable in trusses and girders, and least of all in foundations. The allowance for impact and future increase of street car loads must be carefully considered in determining the additional strength of the structure, but so far as the foundations are concerned, it is doubtful if any allowance for impact need be made.

The best plan to pursue in determining the difference in cost of bridges with and without street cars seems to the writer to be that of comparing the necessary sizes of main members in the two designs. Allowance for the weight of the details of the second structure may be made by considering the details of each individual member to vary in weight in proportion to the variation in the cross-section of the main member. If the structure has been completed, the weight of details may be established by the gross shipping weights reduced by the computed weight of the main sections.

In the case of a reinforced concrete barrel arch bridge, it would seem as if the additional cost would ordinarily be dependent entirely upon the increased width. The cost of engineering, insurance, etc., may be assumed to vary directly with the cost of construction.

The fact that the cost of maintenance and operation of a highway bridge would ordinarily be borne by the municipality should be considered in apportioning the cost to the street railway. This would be particularly

*Abstract of paper presented before Western Society of Engineers, Chicago, on May 10, 1915.

pertinent in the case of swing bridges, where it would seem as if a fair arrangement would be for the railway to furnish the current necessary to open and close the bridge, and for the municipality to maintain the draw tenders and other attendants. In general, it would appear that the street railway might reasonably be charged, as its portion of the capitalized cost of maintenance, a share proportionate to its contribution to the cost of construction.

All of the above discussion should be considered with due regard to the fact that the railway is ordinarily subject to heavy taxes, and in consequence should be entitled to operate without charge across the bridge with vehicles of weight equal to that of the heaviest motor trucks. The only equity in charging the railway more than the ordinary transportation company is because of the heavy loads which it operates.

The conclusions which the writer has drawn from his experience in apportionment cases of this character are as follows:

1. Additional width to provide for street cars is ordinarily necessary only in the case of bridges with narrow roadways, providing for no more than two lines of traffic.

2. The extra expense involved in strengthening heavy city bridges of permanent type to provide for 50-ton trolley cars would not ordinarily be greater than 10 per cent of the total cost, and may be as low as 6 per cent. This percentage will be greater for light country highway bridges without paved floors, but if such bridges are designed for heavy motor-truck traffic, as they should be, the additional expense will not be excessive.

3. To apportion the cost equitably and with credit to the engineering profession, the engineers on the two sides should try to agree upon the additional cost of provision for street cars before the case is presented to an apportionment commission.

4. It is doubtful if the railway should ordinarily be charged for additional convenience due to the reconstructed bridge. This, however, is a matter the settlement of which hardly comes into the province of the engineer.

Jitney Statistics at Fort Worth

Even on the Best-Traveled Route, Over Which Jitneys Were Operated Seventeen Hours a Day, Very Unfavorable Conditions Are Shown

On March 25 the Northern Texas Traction Company made a detailed check of the jitney business on a day of heavy travel. From the figures so obtained tables and a series of corresponding graphs were reproduced.

An assembly of data covering the jitney operation on all Fort Worth lines, hour by hour from 6 a. m. to 12 midnight, showed that the average passengers per trip on the nine divisions ranged from 1.9 to 2.54. The total number of trips made was 7498, the number of passengers carried, 16,661, the average passengers per trip 2.22 and the gross income of 217 cars $833.70.

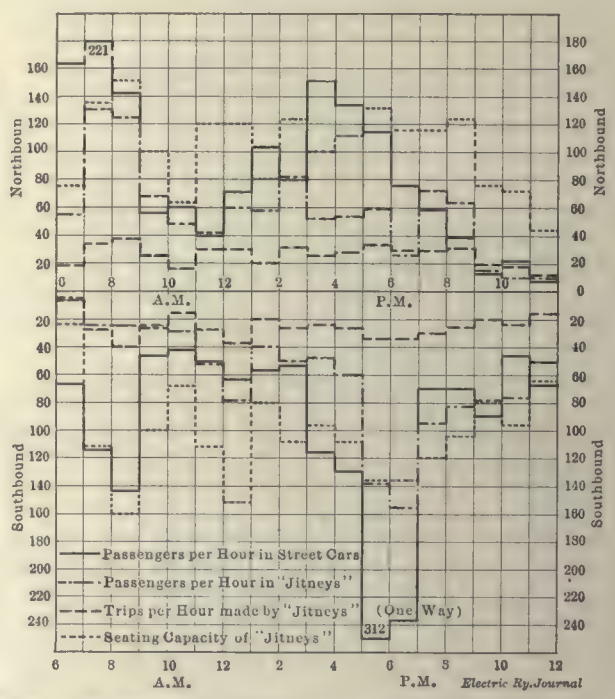
The travel in opposite directions during any given hour showed marked differences, empty trips being numerous. One line, however, was somewhat exceptional in having a fairly even traffic both ways during business hours. The noon-hour traffic was about half that of the peaks on most of the lines.

Among the individual cars on a typical line, which although the longest in the city is also the best-traveled, the highest gross earnings shown were $8.30. But in order to take in this amount the car was operated for seventeen hours, and this necessarily implies the employment of two drivers sooner or later. The gross earnings per mile ranged from 2.5 cents to 3.7 cents. The earnings per hour ranged from 26 cents to 51 cents. The schedule speed averaged about 12 m.p.h., this exceeding the Fort Worth cars by about 50 per cent, but one car made only 7.8 m.p.h. and another 9 m.p.h. The maximum schedule speed was 14.8 m.p.h.

It may be added that in the case of the line in question the maximum run of the jitney is only 3.7 miles long. Even this distance is in excess of the usual jitney ride in other cities, and this is reflected in the condition that the recorded earnings per hour are also somewhat less than usual.

The set of graphs shown in the accompanying cut relates to this line also. In these a comparison is made of jitney versus street railway traffic, also on an hourly basis. The trips per hour made by the street cars are not shown. They amount to four trips each way, during normal hours and from eight to twelve each way during rush hours. The seating capacity of a car on this line is forty, or ten times that of the average jitney.

One unusual feature of jitney operation at Fort Worth is that it was inaugurated by a company which began operation on Jan. 11 with thirty cars. This company has endeavored to keep to certain routes, but modi-



JITNEY STATISTICS—GRAPHICAL REPRESENTATIONS OF COMPARATIVE STREET CAR AND JITNEY TRAFFIC

fications have been made from time to time because of inroads from free-lance jitneys. A check of all the cars operated by this company as made on a given date showed that the maximum gross earnings of any one car were $9.50. This must have included the wages of two men as the car was operated sixteen hours and forty-five minutes. The earnings per mile of this car were only 4 cents. The best figure for any car, 4.2 cents, was made by one which ran for twelve hours and thirty minutes, therefore omitting the leanest traffic hours. The average gross for all cars was but 3.37 cents, barely enough to cover depreciation, fuel and maintenance, let alone wages.

The Texas Power & Light Company on July 1 began to serve power to all Texas Traction Company lines. In the past the railway operated its own power plants, but recently a company was organized to take over the light and power plants.

Electric Railway Session at A. I. E. E. Convention

At the Deer Park Convention One Session Was Devoted to Heavy Electric Traction Contact Systems—Abstracts of the Papers Presented and the Resulting Discussion Are Given

The Thursday morning session of the thirty-second annual convention of the American Institute of Electrical Engineers, which was held at Deer Park, Md., from June 29 to July 2, was devoted to a discussion of the construction and operation of overhead and third-rail contact systems with particular reference to costs. In these papers the practice of some of the most important electrified roads was described and the writers very frankly told of the difficulties which had been met and overcome. The salient features of these papers and of the resulting discussion are covered in the following abstracts.

TOP-CONTACT UNPROTECTED RAILS FOR 600-VOLT TRACTION SYSTEM

Charles H. Jones, assistant electrical engineer Metropolitan West Side Elevated Railroad of Chicago, discussed the various factors which enter into the construction, operation and maintenance of top-contact unprotected rail upon which the gravity type of collecting device was used. He took up the subject under the following subdivisions: weight of rail, quality of rail, insulating and supporting, bonding and jointing, anchoring, special work required, method of connecting at crossings and cost of installation and maintenance.

For rails weighing less than 80 lb. per yard, there is nothing to be gained by the use of high-conductivity rail, which is more expensive and is more difficult to handle than the hard rail, being softer and therefore more easily kinked during installation. There is no appreciable difference in the rate of wear between low-carbon and ordinary steel in the class of service covered in the paper. With light rail it is better to get increased conductance by using a larger cross-section rather than a softer steel. With heavier rail, if by the use of higher conductivity the expense of a paralleling feeder system can be avoided, the high-conductivity rail should be used. On the other hand there is a certain amount of intangible gain to be secured by having a paralleling feeder system, especially with the narrow working margin that is assumed when the difference in conductivity would decide the question of whether or not a paralleling feeder system would be required.

Insulation of a contact rail for a 600-volt system is more mechanical than electrical. Wherever there is any vibration, porcelain and reconstructed granite, or insulators having castings bolted together have not been satisfactory. Mr. Jones stated that a type of insulator consisting of a circular socket base with flange for bolting to the tie, a cylinder of impregnated

CONTACT SYSTEMS—THIRD-RAIL INSULATOR, ANCHOR INSULATOR AND ATTACHMENT, AND EXPANSION JOINT, RECOMMENDED BY MR. JONES

Referring to the tendency to use heavier contact rail, he stated that the advantage to be gained by the use of heavy rail lies in the fact that a large conductance can be secured for about the same amount of labor charge as that required to install lighter rails which can serve as contact members only. If a paralleling feeder system is required a medium weight of rail, say from 80 lb. to 100 lb., will give more satisfactory results. With heavy rails, the advisability of using a special section should be considered for the purpose of throwing more metal into the contact surface and thereby increasing the life. For weights of rail up to and including 80 lb., the standard A. S. C. E. section is satisfactory. As far as the wear is concerned, Mr. Jones gave data to show that contact rail will last twenty years or more.

wood set in the socket, and a circular top casting with a slot on the top to accommodate the base of the rail, a petticoat to shed moisture and a pair of clamps to keep the rail from jumping out of the slot without binding it had proved very satisfactory. The base casting is the same for all weights of rail. The life of an insulator is from ten to twelve years under ordinary conditions, although impregnated-wood insulators have been known to last from fifteen to twenty years.

The third-rail is cut up into sections of from 1000 ft. to 1200 ft. for anchoring purposes and these are anchored at the center. On surface track not provided with a wooden guard rail the conductor rail may be anchored by attaching several strain insulators in multiple to an iron plate which extends over, and is bolted to several ties, the other end of the insulators being

fastened to the base of the contact rail. If wooden guard rail is used, an anchor block consisting of a piece of 6-in. x 8-in. oak 2 ft. long, impregnated with preservative, can be attached to the guard rail, and the contact rail in turn can be bolted to the block. Porcelain insulators may be placed between this block and the guard rail. The best method of providing an expansion gap in the conductor rail is to end a run of rail with an incline leaving a 3-ft. space between stretches. A continuous expansion joint is shown on the preceding page.

Mr. Jones gave the cost of third-rail construction, using 80-lb. T-rail in 60-ft. lengths, as $3,662 per mile for labor and material, of which the labor is somewhat less than 10 per cent. An additional 10 per cent is allowed for engineering and supervision, making a total of $4,028 per mile. For a 50-lb. rail, in 30-ft. lengths, the cost is $3,284 per mile. At an average cost of $80 per mile per year the contact rail can be kept in first-class condition and the insulation changed every twelve years. This, however, does not include complete renewal of rails, plates and bonds, such as will occur when the rail is completely worn out.

OVERHEAD CONTACT SYSTEMS, CONSTRUCTION AND COSTS

Under the above title E. J. Amberg, engineer McHenry & Murray, New Haven, Conn., and F. Zogbaum, engineer of maintenance New York, Westchester & Boston Railway, summarized the experiences of the New York, New Haven & Hartford Railroad and the New York, Westchester & Boston Railway in so far as they related to the construction and maintenance of the overhead system.

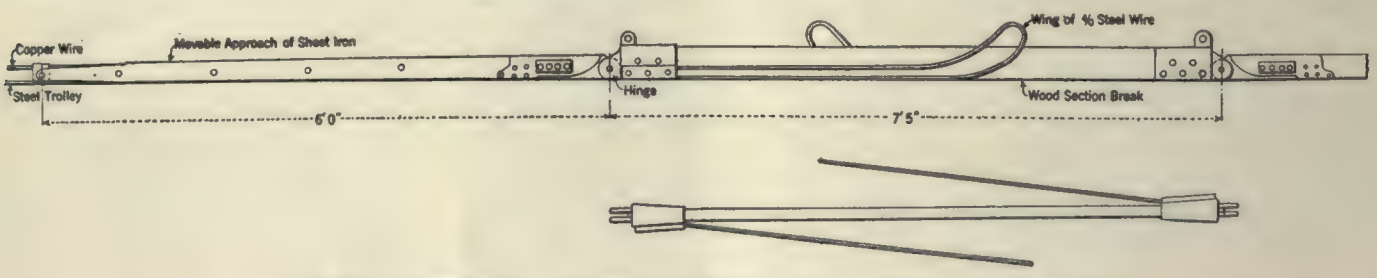
On the New Haven system three types of catenary construction are used; double, compound and single. The first-named was originally considered necessary to provide rigidity, but as first installed it was found not adapted to high-speed service. It was made flexible by the addition of a steel contact wire supported by clips from the copper conductor. The double catenary provided insurance against messenger-wire breakage but it involved several disadvantages. As two live messenger wires were carried over the bridges power had to be cut off to permit work to be done on the trusses. Lightning trouble was experienced with the insulated messenger wire even with electrolytic lightning arresters. The compound catenary provides a grounded messenger wire over each track, removing live parts from the trusses, eliminating lightning trouble and at the same time keeping the trolley wires nearly over the center of a track without the use of pull-off poles except on curves. On curves above 2 deg. the temperature has an influence on the alignment of the contact wire, requiring the use of pull-off spans between bridges. Single catenary is used for both main line and yards. In the latter the copper conductor can be omitted.

Mr. Amberg predicted that steel contact wire will be used less in future although its first cost favors its use. Steel trolley wire rusts considerably and the rust is washed off by rain and drips upon coaches and locomotives, making them unsightly and necessitating frequent painting. If there is not sufficient traffic to keep the under side of the wire bright the rust causes increased sparking and burning of pantograph shoes. On the subject of insulators he stated that the temperature strains in porcelain insulators should be given careful consideration, especially in the dead-end type. Failures have been caused by steam train operation in the electrified zone, breakdowns being most frequent where clearances between the locomotive stack and the insulator are restricted or where steam engines stop under or near insulators. Where clearances are restricted insulators should be located off the center line of the track or two insulators in parallel should be used. In tunnels two insulators in series are advisable.

On the New Haven electrification between Woodlawn and Stamford the bridges were designed so that all overturning moments were taken at the base, requiring large foundations. In later construction the bridges were designed so that the corner connection between the post and truss takes the moment acting across the track. The foundations need then only resist the overturning moment and the shear along the track and can thus be made much lighter. Cross-span construction is adapted for use over a large number of tracks equipped with single catenary, both on main line and in yards.

Mr. Amberg described a flexible wood section break for use in catenary construction, as shown in an accompanying illustration. It is designed to eliminate the hard spot produced by the rigid break. The break proper is connected in the line between two movable sheet-iron approaches. To prevent a train being stalled on the break, flexible wings of heavy steel wire, placed as shown, insure continuity of pantograph contact. These breaks are not necessary in yard construction on account of the slow movement of trains. On the New Haven line, air sectionalization is used wherever possible but there are a number of places where wood section breaks must be used.

Mr. Amberg gave also some curves and tables of costs somewhat similar to those given by W. S. Murray in his Philadelphia paper abstracted in the issue of this paper for Jan. 30, 1913, page 229.



CONTACT SYSTEMS—FLEXIBLE SECTION BREAK NEW HAVEN SYSTEM

Mr. Zogbaum gave the results of operating experience on the New York, Westchester & Boston Railway. He stated that it has not been found advisable to stagger the contact wire to secure uniform wear on pantograph shoes, but called attention to the necessity for allowing for swaying movement of locomotives and cars in locating the contact wire, especially on curves. Trains running at high speed on curves sharper than 1 deg. swing the pantographs toward the outside of the curve. More than 30 per cent of the 54¼ miles of contact wire on this system is over curved track, requiring slight adjustment from time to time.

In addition to the contact wire this system includes 181 miles of transmission line of which 109 miles are

for traction power only, and the balance includes signal feeders and control lines. In the catenary system are six sectionalizing bridges and seventy-seven high-tension oil circuit breakers used for sectionalizing the high-tension power. In maintaining this system a force consisting of an engineer of maintenance, a general electrical foreman, one day foreman, one night foreman, five linemen and one assistant lineman is required. The force is able also to do the necessary construction work. It uses a work train consisting of a gasoline-electric locomotive and a work car, the locomotive containing an overhead platform. On the work car is a searchlight for use in making inspections and repairs.

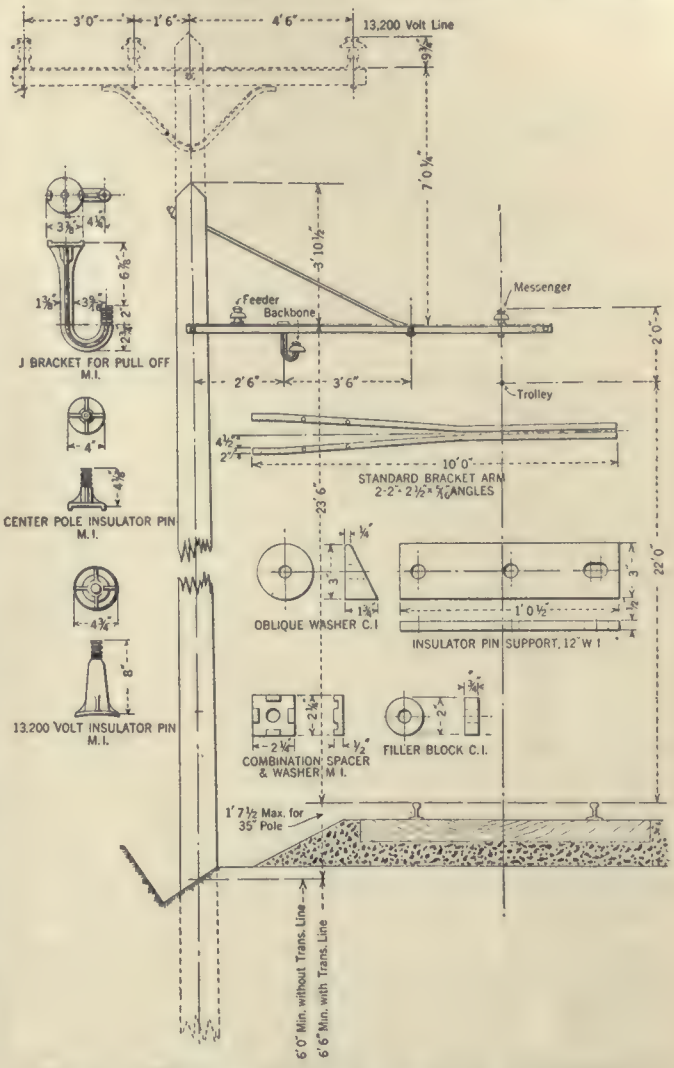
Very satisfactory operating efficiency has been secured, there having been in 1913 27,927 car-miles operated per pantograph failure; in 1914 55,503 car-miles, and in the three months ending March, 1915, 64,799 car-miles. The causes of pantograph breaks were: wire off center, low joints on running rails on curves, overhead frog on deflector out of adjustment, and loose sleeves on contact wire. In 1913 practically 880,000 train-miles were made with 210 delays of a total duration of 2170 min. from power trouble, and seventeen delays with a total duration of 129 min. from pantograph and contact-wire trouble. In 1914, with practically the same mileage, power trouble produced but ninety-seven delays of 2256 min. duration, while pantograph and contact-wire trouble produced fifteen delays of 117 min. duration. In the first three months of the current year, with proportional mileage, there was no power trouble, and but one delay of 2 min. duration from the other source. Details of the causes of the various delays were given, and train-minutes delays by months were charted. The road has an excellent insulator-failure record, troubles from this source being practically negligible.

The wear on the under side of the grooved-steel contact wire has produced a 1/8-in. flat surface, and this has been uniform over the line, no difference being noted between high wire and low wire, tangent track and curves. From present indications the steel wire will have a total life of from six to seven years. Pantograph mileage varies from 1000 to 1300 miles in the winter up to considerably more than 2000 miles in the summer. The higher mortality in winter is due to the necessary increase in tension on account of the contraction in the contact wire. The total maintenance cost per car-mile for July, 1914, is given as 1.56 cents and for December, 1914, as 1.42 cents, including supervision of transmission and contact system, miscellaneous electric line expenses, work train, etc. Details of the actual expenditures for selected months are included in the paper. It also contains a digest of the operating rules and regulations of the organization.

CONTACT SYSTEM OF THE SOUTHERN PACIFIC COMPANY, PORTLAND DIVISION

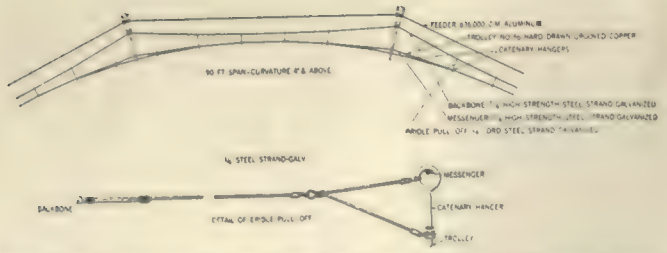
Paul Lebenbaum, electrical engineer Portland, Eugene & Eastern Railway, described the overhead construction of the electrified lines of the Southern Pacific Company between Portland and Whiteson, this being the first electrification in Oregon of the Southern Pacific System. The electrification involved 104 miles of single track with approximately 16 miles of second track and siding. With the exception of 3 miles of 600-volt trolley in Portland, the operating voltage is 1550. Electric operation was begun on this system in January, 1914.

In general, side-bracket catenary construction of the type shown in an accompanying illustration is used, the 13,200-volt high-tension line being carried on the same poles on parts of the system. Standard pole spacing



CONTACT SYSTEMS—STANDARD BRACKET CONSTRUCTION PORTLAND DIVISION, SOUTHERN PACIFIC COMPANY

CONTACT SYSTEMS—SINGLE-TRACK CURVE CATENARY CONSTRUCTION, WITH 13,200-VOLT TRANSMISSION LINE, ON PORTLAND DIVISION, SOUTHERN PACIFIC COMPANY

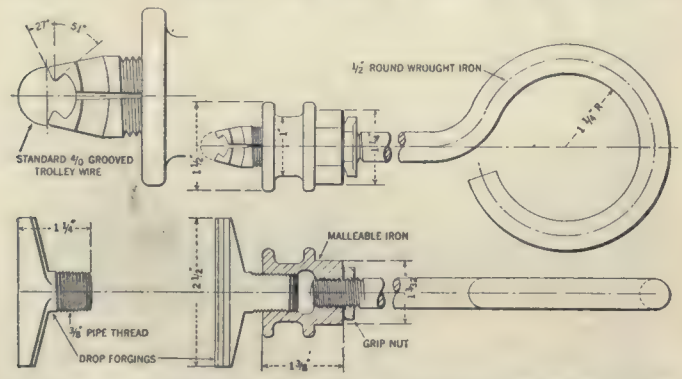


CONTACT SYSTEMS—STANDARD PULL-OFF CONSTRUCTION PORTLAND DIVISION, SOUTHERN PACIFIC COMPANY

on tangents is 150 ft., but the average rate of distribution of poles is fifty-four to the mile, there being 25 per cent of the main line mileage in curved track. The standard pole length for catenary construction is 35 ft. and for transmission and catenary 40 ft. These poles cost at the hole as follows: 35 ft., $6.90; 40 ft., $7.50; 45 ft., $8.25; 50 ft., $8.85, and 55 ft., $9.60, the lengths greater than standard being used for telephone and telegraph line crossings, etc. All poles were given two brush treatments with carbolineum avenarius from a point 18 in. above the ground to within 3 ft. of the butt. The preservative was applied by means of burlap fastened to the ends of long mop handles, and it was kept hot by steam coils placed at the bottom of the shallow tank over which the poles were rolled. Approximately 1 gal. of preservative, including losses, was used per pole.

The catenary hanger used was of the loop type. As roller pantographs were used, great flexibility of the contact system was necessary, especially on curves. On the latter a pull-off construction like that shown in an accompanying illustration was used.

Basing the annual cost of maintenance on the experience from Oct. 1, 1914, to March 31, 1915, when the contact system was almost new, the values are: For material, $804; for labor, $7,320, a total of $8,124, or $78.11 per mile per year. The maintenance crew consisted of one foreman, three linemen and four groundmen. In addition to maintaining the contact system this crew handled all repairs to the 13,200-volt transmission lines and 2½ miles of 60,000-volt transmission lines. Gasoline section motor-cars, equipped with towers are used for maintenance. On the electrified section the average train-miles per day are 1460, motor-car-miles per day, 3041, and trail-car-miles per day, 560. The weight of the motor-car is 53 tons, that of the trail car 35 tons and the schedule speed is 20 m.p.h. The average running current per motor-car is 200 amp. The cost of maintaining the roller collectors, which are now equipped with roller bearings, is about 40 cents per 1000 motor-car-miles. The collectors are made of 5-in. steel tubing and they are operated at a pressure of from 30 to 35 lb. against the wire. The mileage per collector has been about 9700, but this



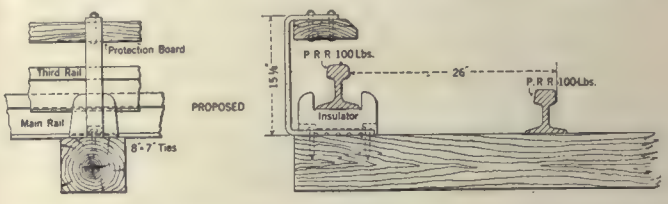
CONTACT SYSTEMS—STANDARD CATENARY HANGER PORTLAND DIVISION, SOUTHERN PACIFIC COMPANY

record was lower than it should have been because a defective quality of tubing was originally furnished. The wear on the trolley to date has been inappreciable.

THIRD RAIL AND TROLLEY SYSTEM OF THE WEST JERSEY & SEASHORE RAILROAD

J. V. B. Duer, assistant engineer Pennsylvania Railroad, Altoona, Pa., gave construction and operating data regarding this property in addition to those already available. The system has a total of 131.7 miles of third-rail track and nearly 20 miles of trolley track, about a mile of the latter overlapping the third-rail. Substations are 10 miles apart and no third-rail feeders are used. The substation bus voltage is 700. Trains of from two to seven cars are operated between Camden and Atlantic City.

The third-rail insulators are of reconstructed granite or porcelain and are held in position by a metal centering cup which is secured to the ties by means of lag screws. The rail rests upon the insulator and is not clamped thereto. The insulators are placed on



CONTACT SYSTEMS—PRESENT THIRD-RAIL CONSTRUCTION WEST JERSEY & SEASHORE RAILROAD

ties 9 ft. 4 in. long, spaced approximately 8 ft. apart. This type of insulator, shown in an accompanying illustration, has been adopted on account of a change in the method of supporting the top protection board.

Originally the third-rail was equipped with protection only at stations, 75 ft. on either side of road crossings, and in terminal yards. This protection consisted of side and top boards carried from castings attached to the rails by hook bolts. Maple posts were attached to the bottom castings by bolts and supported top castings carrying the top protection boards. During the early part of 1912 top protection was added to all unprotected rails using the plan already mentioned. The boards were treated with two coats of hot creosote, and contiguous boards were joined by means of wrought-iron plates.

The original cost of construction of this line was as follows: For the 131.73 miles of third-rail, including the rail, bonding, insulators, protection, etc., $557,636, or $4,235 per mile; for the 19.56 miles of trolley, including wires, poles, line material, lightning arresters, etc., $80,500, or $4,120 per mile. The track bonding of 151.29 miles cost $102,659, or $678.50 per mile.

Shortly after the third-rail was placed in service it began to creep in the direction of traffic, with constant

CONTACT SYSTEMS—STANDARD THIRD-RAIL APPROACH WEST JERSEY & SEASHORE RAILROAD

damage to insulators. To overcome the difficulty the third-rail was anchored to the ties at intervals of from 1000 ft. to 1500 ft. and the practice of periodically loosening the splice bars and oiling the joints was instituted.

Although sleet-cutting shoes were used on the cars during certain seasons, with a provision for applying extra tension of from 90 lb. to 100 lb. to the shoes, considerable delay was occasioned by sleet. This has been minimized by the use of calcium chloride supplied from tanks and distributed hot on the rail. These tanks were hauled over the road by steam locomotives when sleet began to form, with good results. The addition of the top protection to the rail prevented sleet formation except when a driving wind accompanied the sleet-forming weather, in which event the chloride cars were used as formerly.

During seven years past the average maintenance cost per single-track mile per year has been $490.25 for the trolley, $81.74 for the third-rail, and $25.84 for the track bonding, which amounts are respectively 11.9, 1.9 and 3.8 per cent of the corresponding investments.

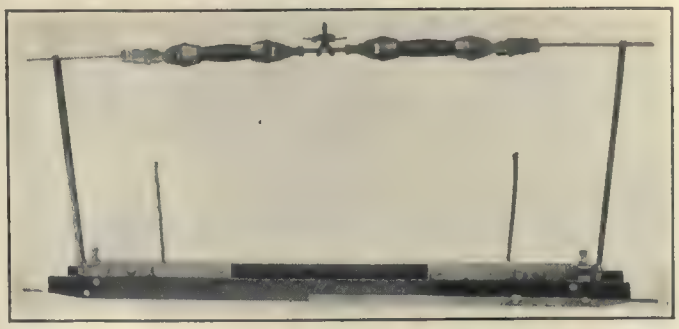
During the year 1912 the car-miles per minute of detention from various causes chargeable to the contact system were as follows: Third-rail short-circuits, 56,673; third-rail out of place, 1,161,809; third-rail protection out of place, 232,362; sleet on third-rail, 11,885, and trolley-wire trouble, 17,085.

CONTACT SYSTEM OF THE BUTTE, ANACONDA & PACIFIC RAILWAY

In an elaborate paper J. B. Cox, railway engineering department General Electric Company, described many of the special problems of the design of the rollers and overhead construction for this electrification. Overhead construction was used because approximately 60 per cent of the electrified tracks consist of yard trackage and sidings with numerous switches and street crossings.

The roller used consisted of a Shelby steel tube 5 in. in diameter, 24 in. long and ⅛ in. thick when turned. Removable bearing housings of aluminum metal were fitted into each end of the tube, each carrying two bronze sleeve bearings. The complete roller revolved about a ⅝-in. steel shaft fixed at each end by clamps to the pantograph frame. The complete roller weighed about 31 lb. As this weight was much greater than that of the contact element of a sliding pantograph, it was decided not to attempt to make the contact device respond to inequalities due to hard or uneven spots in the trolley wire but to remove such spots. After experience with the operation of this roller it was modified by installing Hyatt roller bearings, which have proved very satisfactory. Early troubles in keeping the roller on the trolley wire have been overcome by the installation of improved wearing or guide plates.

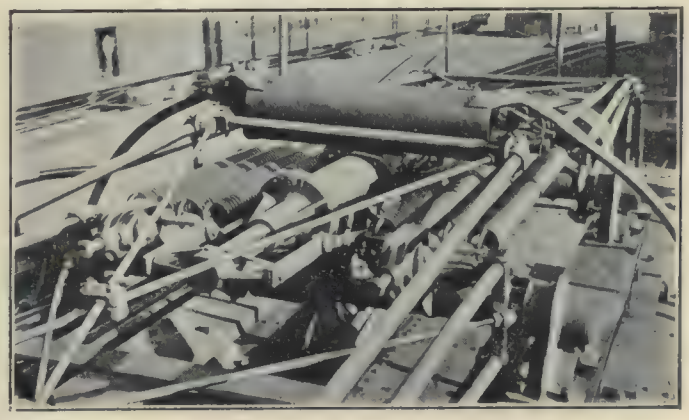
In producing a flexible trolley wire a new hanger was devised. It was made up of ⅝-in. x ⅛-in. flat strap, with a malleable-iron ear secured by a ½-in. x 1½-in. carriage bolt. The upper end was looped over the messenger wire, giving a flexible support. The jaws were designed to permit the operation of a trolley wheel should such be desired. A special pull-off was also designed by means of which the messenger and trolley wires were held in position by separate clamps, from each of which ran an individual pull-off wire with a strut between the two, maintaining the pull parallel to the horizontal plane of the trolley wire and allowing a free vertical movement independent of the messenger. The single pull-off of the type described was found superior to a double pull-off or a rigid pull-off, although these were used in some cases. It was found unnecessary to use deflectors such as are generally required with pantographs. Instead, the trolley and messenger wires which were intended to follow a switching track were started several feet ahead of the switch from a point convenient for dead ending, and several inches above the horizontal plane of the through wires, and gradually brought down to that plane a short distance ahead of the switching point where they were gradually carried away following over the switching track. Air-section insulation was used where practicable, the ends of the wires of each section being made to overlap the length of a pole spacing, the two sets of wires being carried in approximately the same horizontal plane and about 12 in. apart for a few feet in the middle of the span, from which point the dead ends of the trolley wire were gradually carried above the path of the collector to the anchorage.



CONTACT SYSTEMS—SECTION INSULATOR FOR PANTOGRAPH COLLECTOR, WITH ATTACHMENT TO SPAN WIRE

At street railway crossings two wooden section insulators were connected in the 2400-volt line about 75 ft. apart with a protecting zone between. The railroad tracks cross street railway tracks at six points, four of which are at street level in Butte. Two in Anaconda are not at street crossings and here the street railway company coasts its cars over the crossings. At two crossings in Butte watchmen employed to operate gates manipulate the switches which are interlocked with the gates. Special commutating switches were provided to overcome arcing difficulties.

The total cost of the trolley and feeder system, inclusive of bonding and all changes made necessary in the way of clearance for poles, bonding, etc., up to June 30, 1914, was slightly more than $500,000, or for the overhead system, including feeders and bonding, $5,514.15 per track-mile or $13,381 per route-mile. All of the construction was done while the road was under full operation and under many conditions which tended to increase the cost above normal. Among these were: the large percentage of curves and special work, the high price of all labor, interference of foreign wires, changes



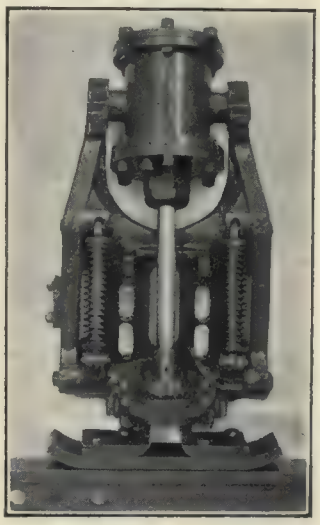
CONTACT SYSTEMS—ROLLER PANTOGRAPH MOUNTING WITH IMPROVED WEARING PLATES

in location of tracks, walkways, platforms, buildings, trestles, bridges, etc., extra-heavy foreign traffic on the main line, strike of electrical wiremen, cold weather, variation of ground condition, number of street railway crossings, etc. Seldom would there be found more complications than in this case.

Repair work on the 2400-volt trolley line is done from an ordinary wooden work car without special insulation with full voltage on the line and there have been no serious cases of shock to linemen.

The cost of maintaining the distribution system from October, 1913, to March, 1915, inclusive, has been slightly under $15,000. This is at the rate of $9,930.46 per year or $109.13 per mile per year. The paper gives full details of maintenance costs. Measurements have been recently made to determine the rate of wear of the trolley wire, the original diameter of which was supposed to average about 0.482 in. With due allowance for the change in the form of the wire as it wears, and from the fact that the measurements show an average of 3041 pantograph passages per 0.001 in. wear, the wire can be expected to last twenty-two years.

The difficulties with the contact roller have not been greater than were expected. At first



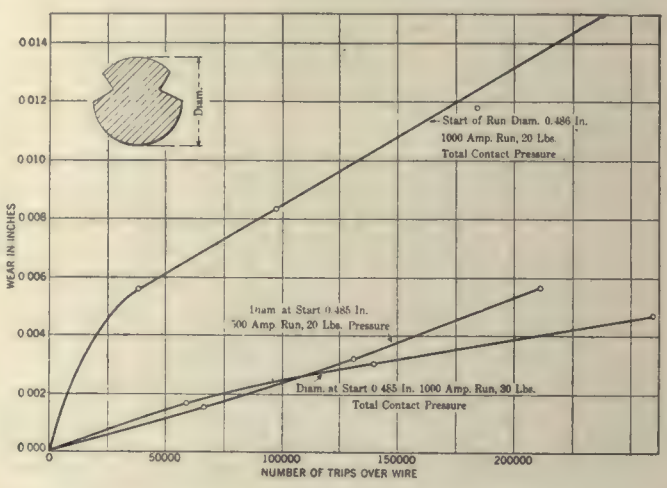
CONTACT SYSTEMS—HIGH-TENSION THIRD-RAIL ON EXPERIMENTAL LINE IN ERIE. AIR-OPERATED THIRD-RAIL COLLECTOR FOR HIGH VOLTAGE LINE IN MIDDLE WEST

sticking in the bearings occurred due to imperfect alignment of clamping jaws, loosening of the caps in the bearing head, collection of ice between the roller and the support, etc. These were overcome by simple expedients, including the adoption of roller bearings already mentioned. From results so far obtained the average mileage per tube is about 11,030. The average mileage with roller bearings is about 16,000, an increase of 35 per cent. The average cost of maintaining the original pantographs with three bearings was about $185 per month, or $3.20 per thousand locomotive-miles. The present corresponding cost is about $35 per month, or $0.62 per thousand locomotive-miles. At first a wooden lining was pressed inside the roller, but this was found unnecessary and is now omitted.

Measurements made to ascertain voltage drop and energy consumption show the maximum voltage drop to be 14.5 per cent, the average being 5.6 per cent. In the Smelter Hill service, with an average train weight of 1633 tons and a schedule speed of 15½ m.p.h., at an average voltage of 2293, the average power consumption was 1398 kw., and the current 767 amp., while the unit energy consumption was 55 watt-hours per ton-mile. From Rocker to East Anaconda, with a schedule speed of 20.1 m.p.h., the average was 13.73 watt-hours per ton-mile.

CONTACT CONDUCTORS AND COLLECTORS FOR ELECTRIC RAILWAYS

The problem of current collection as a whole and the essential factors in successful operation were discussed by C. J. Hixson, railway engineering department General Electric Company. He called attention to the fact that the A. I. E. E., when defining standards for electric railways, subdivides distributing systems into two classes—contact rails and trolley wires. He followed the same subdivision in contact devices, namely, contact rail collectors and trolley wire collectors. Similarly,



CONTACT SYSTEMS—WIRE WEAR WITH SLIDING CONTACT CURRENT COLLECTION

rail collectors were subdivided into: third-rail shoes, overhead shoes, center shoes, and underground shoes. Trolley-wire collectors were classified as wheel trolleys, roller trolleys, and slider trolleys. The frames supporting the collecting mechanism may be pole, bow, or pantograph. The term "pantograph trolley" is not definite, since it designates a form of frame common to all three types of trolley wire collectors.

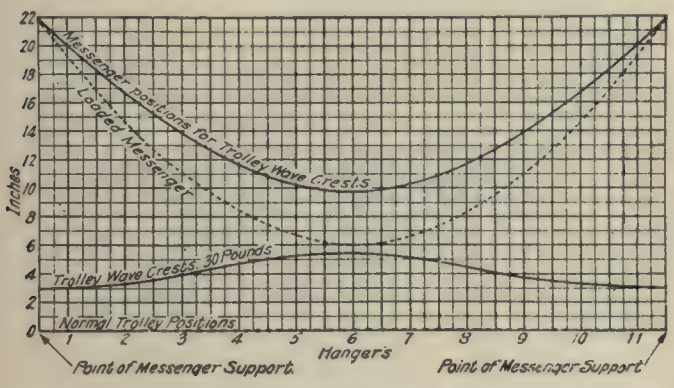
Contact-rail systems possess great reliability and involve low maintenance cost. They are particularly adapted for elevated and subway work, especially where it is necessary to change quickly from one to the other. High collecting capacity and space considerations are also in their favor. The high initial cost, danger to life, difficulties from sleet and snow, and complications in yards have been among the factors preventing their wide application to interurban and steam road service. Inverting the rail and using an underrunning shoe have overcome sleet and snow difficulties with some increase in cost. A 2400-volt third-rail is operative and its use permissible under some conditions.

Contact-wire systems are of two types, direct suspension and messenger or catenary suspension. The

CONTACT SYSTEMS—1200-VOLT SUSPENSION WITH PORCELAIN INSULATION

direct suspension is suitable for low speeds and moderate amounts of power and, with the contact wire insulated by suspensions of molded insulation or other suitable material, gives good service. Giant strain insulators are in many cases connected in the span wires. The wood pole is undoubtedly responsible for much of the success of direct suspension. The use of wood for poles and insulators is gradually decreasing and porcelain is being adopted for strain and suspension insulators. Direct suspension is cheap and has performed useful service in keeping down initial investments, but with increasing speed and capacity requirements a more flexible form of construction is needed.

With messenger suspension the effect of the messenger wire is of great assistance in increasing the



CONTACT SYSTEMS—TROLLEY WAVE CREST CURVE AND POSITIONS OF MESSENGER

height of the wave produced by the passage of the collector. The crest of this wave is over the collector and the height depends upon the elasticity at that point. If the hanger is designed to permit a free further upward movement of the trolley additional flexibility is secured.

Mr. Hixson gave the results of measurements made to determine the upward deflection of the trolley wire under different conditions of support and pressure. Typical results are shown in the accompanying diagrams. He also gave a pair of characteristic pantograph curves showing the relation of roller pressure to roller position, and other curves of importance in current collection under heavy traction conditions. He concluded by listing the following as topics worthy of discussion in this connection:

The use of deflectors or other devices at sidings.

The best method of section insulation.

Convenient means for taking up slack at anchorage vs. automatic take-up devices in conjunction with the introduction, artificially, of elasticity into the line.

Elimination of splicing sleeves, particularly of the soldered type.

The necessity for staggering the trolley wire and frequency of steady braces against action of the wind.

Construction at tunnels and bridges both as regards insulation and collection.

The necessity for uniformity in the safety factors allowed in different parts of the country.

The best method of arranging "ticklers" for warning the brakeman of approaching bridges or tunnels upon electrified lines.

In regard to the problems which might be discussed in connection with trolleys might be mentioned:

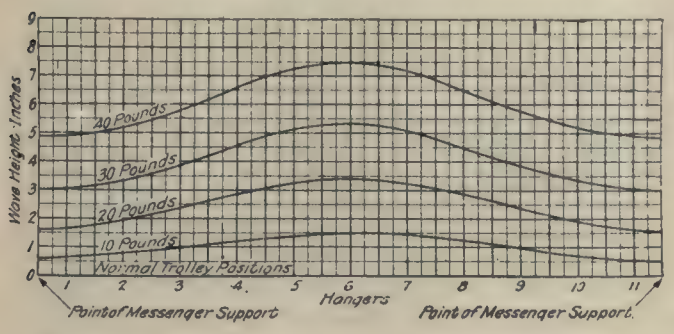
The desirability of the air-locked vs. the air-raised type.

Height of the trolley wire.

Width of contact strips.

Shape of horn.

Clearance allowances between trolley and permanent way.



CONTACT SYSTEMS—TROLLEY WAVE CREST CURVES FOR DIFFERENT PRESSURES

DISCUSSION ON CONTACT SYSTEMS

In the discussion of the topics covered in the papers and in connection with the presentation of the papers by the authors many valuable additional points were brought out. Mr. Duer said that on the West Jersey & Seashore Railroad reconstructed granite insulators are being used to replace worn-out porcelain ones. One reason for the selection of the same rail section for the contact rail as for the main rail was to give facility in making track repairs. He called attention to the independence of the new protection which he described from the contact rail, insuring non-interference with creepage, expansion, and contraction. Insulated anchors had been tried in an endeavor to prevent creepage, but they were the source of fires, and their use was abandoned in favor of oiling the angle plates. Stranded bonds have been substituted for ribbon bonds to give increased flexibility, although Mr. Duer thought that the latter might be satisfactory with very well ballasted track. The bond testing is done in a preliminary way by men equipped with contact points in their shoes connected to an indicating instrument. These men mark bad bonds for further and more accurate test. In reply to questions regarding the chloride treatment of steel he said that the specific gravity of the solution is 1.2 and that the solution is spread by means of special shoes. An overrunning conductor rail should be wide and low for stability, but raised on high insulators to protect the latter from stray ballast. Careful attention should be given to side and end approaches, as the shoes on high-speed cars are apt to be thrown against the protection boards at these points. On the West Jersey & Seashore Railroad end protection boards have to be renewed annually on account of the wear due to contact shoes. Metal sheathed side approaches were used on the Pennsylvania Railroad New York terminal.

Mr. Cox stated that on the Butte, Anaconda & Pacific electrification the safety of people who could not be kept away from the tracks was an important factor in the choice of an overhead contact system. In the paper no detention records were given because detentions had been negligible. While the dispatcher notes detentions on his record sheet they have not been important enough to warrant tabulation. Most of the troubles with the rollers at first were due to their not rolling.

Mr. Hixson said that he had felt the necessity of obtaining a comprehensive grasp of the whole subject of contact systems, and the purpose of his paper was to summarize the situation. The measurements described were the result of an effort systematically to improve operating conditions. He emphasized the im-

portance of the flexibility of the messenger wire in absorbing waves as indicated by the hanger loop, which is lifted less at the center of the span than at the points of support. The pull-off presents the most difficult problems in overhead design and in choosing a method of support the designer must decide as to the influence to be allowed special construction, such as that on curves, in determining the plan to be followed.

G. H. Hill, engineer railway engineering department, summarized briefly a contribution to be published later in the proceedings. He stated that the costs of third-rail and trolley construction are about equal. The former is necessary with low-voltage heavy traction, but the general tendency is toward overhead construction. The lubrication of overhead pantograph shoes is a very important matter and can be accomplished readily, one plan being to use an inverted pressed-steel pan, shod with copper strips and with a central groove for storage of lubricant. The lubricant consists of graphite grease. This forms a film on the contact wire and incidentally prevents sleet accumulation. Adding lubricant does not interfere with current collection for the contact electrical resistance is actually lowered. Taking up the important subject of inductive voltage rises in overhead wires and in third-rail, Mr. Hill stated that there is a considerable rise and that this is about the same in the two. While the inductance of the rail is greater this produces a time lag which keeps down the voltage. The energy discharge is, of course, much greater from the rail. The peak voltage may be double the operating voltage.

H. M. Hobart, consulting engineer General Electric Company, described a novel form of third-rail construction being installed on the 1200-volt electrification in England between Manchester and Bury. This will be open for traffic in a few months. The rail is of the side-bearing type of channel section, protected all around with the exception of a top slot to admit the flat, hinged collector shoe. The rail with its protecting boards rests loosely in a slot on the top of the insulator and the protecting boards are held in place by means of steel spring clips and wooden wedges. Additional details of this installation will be given in an early issue of the ELECTRIC RAILWAY JOURNAL. The rail is the invention of J. A. F. Aspinall, general manager Lancashire & Yorkshire Railway. Mr. Aspinall is essentially a steam railroad man who appreciates the possibilities of electricity as a motive power. The installation is attracting much attention in Great Britain.

In reply to a query Mr. Zogbaum stated that wood insulators are generally used between tracks on the New Haven system with good results. They are thoroughly cleaned every three years. Prof. D. D. Ewing wanted to know if the maintenance cost of running rails is increased by the presence of the third-rail, and Mr. Duer said he would furnish data on that subject.

Prof. D. C. Jackson, Massachusetts Institute of Technology, chairman of the railway committee in charge of the program of the railway session, closed the discussion by referring to some research work which Dr. A. E. Kennelly, Harvard University, and he had under way relating to skin effect in rail conductors. This promises interesting results which will bear upon the subject of inductive effects in third-rail.

The session closed with an expression of its unique character and of the great value of the cost data contributed, such data being as a rule almost inaccessible.

A recent disastrous wreck in England was caused by the entry of an express train into a block where a local train was standing, an improper clear signal having been given by the manual-block operator.

A. S. T. M. Specifications for Trolley Wire

Committee on Copper Wire Outlines Reasons for Failure to Agree with American Electric Railway Engineering Association

At the eighteenth annual meeting of the American Society for Testing Materials, held in Atlantic City on June 22-26, the report of most importance to electric railways was that on copper wire specifications. In this the differences between the A. S. T. M. committee and the committee on power distribution of the American Electrical Railway Engineering Association were outlined as follows, the A. S. T. M. committee being referred to as Committee B-1 and the A. E. R. E. A. committee as the Power Committee:

"In the last two reports of the committee, reference has been made to work undertaken in conjunction with a sub-committee of the Power Committee of the American Electric Railway Engineering Association, with a view to the formulation of specifications for trolley wire, which might be adopted as the standard by both societies. Specifications were tentatively proposed by the A. E. R. E. A. sub-committee, which were reluctantly accepted by the sub-committee of Committee B-1. But Committee B-1 could not agree to these specifications, which in some important respects were different from our standard specifications, and radically at variance with definitely expressed opinions of the committee. Therefore, in 1914, Committee B-1 reported postponement of final action on these proposed specifications, and began to collect data and opinions from a number of large electric railways using trolley wire, on their practice with respect to specifications, and the necessary requirements for such wire. This canvass showed that a considerable majority of those roads buying under specifications had already adopted substantially the requirements of the standard specifications of this society. Many large purchasers were using no specifications, while others were buying a high-strength alloy wire instead of copper. In the meantime the Power Committee had presented to the American Electric Railway Engineering Association at its annual meeting, the proposed specifications which have been adopted.

"Finally at a meeting of Committee B-1, with nine of the eleven members present, it was unanimously voted that Committee B-1 recommend no change in the present standard specifications for hard-drawn copper wire in so far as they apply to trolley wire.

"For the information of the society, the committee makes this brief statement of the two points of difference between themselves and the Power Committee of the A. E. R. E. A.: (1) The Power Committee was of the opinion that trolley wire should not be hard drawn but should, in effect, be somewhat less than hard drawn, that is, more nearly what is defined as medium hard drawn; yet the values for strength proposed were, for minimum values, substantially those of our standard specifications for hard-drawn copper wire. (2) The Power Committee, after long consideration and after many tests had been made, appeared to agree that the twist test, upon the inclusion of which it was insistent, could only safely be applied qualitatively; yet the committee insisted upon specifying a definite minimum number of twists.

"To neither of these points could Committee B-1 agree. The first was considered inconsistent. The second the committee felt was adequately covered in the specifications as offered for amendment later in this report, namely, by the requirement that the wire shall be free from imperfections not consistent with best commercial practice. In the opinion of Committee B-1,

other tests than the twist test may be preferred for the inspection of wire, and the committee sees no reason to make arbitrary choice among them."

The report went on to say also that as a result of the canvass of the practice of electric railways, Committee B-1 was convinced of the desirability of offering specifications for high-strength alloy trolley wire, and tentative specifications for this material were appended to the report. These provided for bronze wire of 40 per cent conductivity and approximately 70,000-lb. tensile strength and from 2.25 per cent to 3 per cent elongation in 10 in.; also for bronze wire of 65 per cent conductivity, about 60,000-lb. tensile strength and the same elongation, which depended on the size of the wire.

Tentative specifications for bare concentric-lay copper cable, hard, medium-hard or soft, were also submitted and both of these were ordered printed in the association's year book. Minor changes in the previously-mentioned specifications for hard-drawn copper wire were referred to letter ballot.

Mandatory Rules *

BY F. M. METCALFE, SPECIAL REPRESENTATIVE FIRST VICE-PRESIDENT OF THE NORTHERN PACIFIC RAILWAY

The railroad workman of to-day is no longer an automaton. He has developed into a reasoning being. This has created new economic conditions and demands progressive methods.

The rules by which we are governed in our railroad work have been amended and amplified from time to time, as our business has increased, and have become more progressive and complex. To-day they are the product of the minds of our ablest and most experienced railway operators, formulated after much study and discussion and presented as the acme of good practice. The standard transportation rules are largely mandatory. They tell men what they must or should do. But by the frequent and continued infraction of these rules, despite disciplinary action, railroad managers now realize that education and persuasion must substitute coercion and compulsion, as is illustrated by their vast annual expenditures for increased supervision.

My belief is that mandatory rules do not materially prevent accidents but that organized effort and the persuasive use of safety devices and methods are the means which should be substituted.

Transportation by Fadgl Auto-Train at San Francisco Exposition

The Fadgl Auto Train, Inc., has been carrying approximately one-fourth of all Panama-Pacific Exposition visitors in eighteen three-car trains of sixty-six seating capacity or 105 total capacity per train. The longest run one way is 1½ miles and the shortest is ⅜ mile. The initial fare is either 5 or 10 cents, according to the character of the run. Zone-fare additions of 5 cents each are charged when passengers make partial or complete circuits.

On Feb. 20, the opening day, fifteen two-car trains and one one-car train carried $3,246.95 of business. Up to June 1 about 1,250,000 passengers were carried, but it is expected that heavy summer business will bring the total for the year in excess of 4,000,000. The number of fares during four days of June averaged 15,150 a day.

All fare collections during this period were handled with Rooke registers.

*Abstract of paper presented at annual meeting of Pacific Claim Agents' Association, San Francisco, June 24-26.

Medical and Claim Departments *

BY J. H. HANDLON, CLAIM AGENT UNITED RAILROADS OF SAN FRANCISCO

The relationship existing between the medical departments and the claim departments of rail transportation companies varies to such an extent that there is no general uniformity of co-operation. Some companies do not maintain a salaried medical staff but secure the services of outside surgeons when necessary. Others, particularly street railway companies, designate resident surgeons to examine the injuries in their several districts and report on a fee basis to the salaried chief surgeon of the company. These district surgeons also render emergency treatment. Many steam railroads and interurban and suburban electric railways adopt a similar plan on account of the convenience of having a surgeon representing the company promptly at the scene of the accident.

Some companies maintain a salaried medical staff, which, if possible, renders immediate and continuous surgical and medical attention at the sole expense of the company and without respect to the question of liability. Still others employ a salaried emergency surgeon who is always on duty, ready to make an immediate examination of personal injury cases and treat such cases, if necessary.

It is the practice of the United Railroads of San Francisco to request an early examination of all injured persons by one of its salaried medical staff, regardless of whether a claim has been filed or such action is intended. Medical attention and hospital accommodations are offered only in cases where the company's liability is clearly established. Emergency treatment is usually rendered by the city emergency hospital surgeons or surgeons residing or having their office near the scene of the accident. A fee of $10 is allowed by the company to practising surgeons whose services are sought in an emergency by an employee.

Wherever feasible (local conditions always governing) the services of the medical department are more effective if it is composed of surgeons who are on the payroll and devote almost all of their time to company business. It is true that surgeons who are occasionally employed on a fee basis are not so likely to have their testimony attacked as prejudiced and biased, but unscrupulous attorneys often attack the reliability of such witnesses, particularly if they have testified on several occasions in behalf of the defendant corporation.

The surgeon whose time is devoted almost exclusively to the company becomes a specialist in personal injury cases. He is aware of the dependence placed upon him by the claim agent in reporting as accurately as possible the extent and length of disability, and he is alive to the advantage of employing simple and unsuspected tests of the claimant's veracity and physical ability. He is able to judge the monetary value of a claim and the reasonableness of charges for surgical services. If he is tactful and considerate in his behavior toward a claimant, he can influence him to deal directly with the company. It is highly important, however, that he should not make an intentional misstatement of the extent of the injury to an injured person with a view of minimizing the injuries and so enabling the claim agent to effect an unjust settlement. Neither should he resort to any similar deception, for the courts have held that a release secured through such fraudulent methods is voidable. An error in diagnosis is excusable in the eyes of the law.

*Abstract of paper presented at annual meeting of Pacific Claim Agents' Association, San Francisco, June 24-26.

COMMUNICATIONS

Flange-Bearing Special Work

METROPOLITAN STREET RAILWAY COMPANY
KANSAS CITY, MO., June 25, 1915.

To the Editors:

Concerning the question of flange-bearing special work, the following is my experience in Kansas City: In order to avoid noisy special work and the hard blows incident to the use of very abrupt rises in the flangeway, the writer adopted flange-bearing work with long approaches about four years ago. Experience with this type of work since that time has fully justified the change.

The principal problem to solve in connection with the flange bearings was the lengths of the inclined approaches to the intersections. It was impossible to get the desired results with the small manganese inserts that were in use a few years ago. Moreover, the best results cannot be obtained with the largest practicable plates used to-day except in those in very acute angle intersections. If it is practicable, the length of the approach from the point where the flange begins to take a bearing to where it is raised to its greatest height should not be less than 18 in. In order to secure approaches of this length we built some special work of carbon rails bolted together with the manganese fillers forming the flangeway floors. Similar construction with a bar of manganese inserted in a rolled filler in the bottom of the flangeway was adopted, and both types of work have given most excellent service. Later, crossings were assembled as bolted work, using high carbon rail in the bottom of the flangeways. This has given results as good as, if not better than, were obtained from that with the manganese in the bottom of the flangeway.

In all of these types of work, when the flangeway is worn down so that the wheels have a tread bearing, it is practicable to grind down the head of the rail and thereby secure a true flange bearing again. Our later work, some of which has been ordered in the solid manganese steel, provides for a flange bearing with 18-in. approaches. A feature found undesirable in our first flange-bearing crossings was the raising and lowering of the wheels over each flangeway intersection. To avoid this, it has been our practice, and it has proved entirely satisfactory, to raise our wheels upon the flange as they approach the first intersecting flangeway and continue the shallow depth through the crossing. This has been done in right-angle crossings and the wheels are carried upon their flanges entirely through the crossing or series of crossings as the case may be.

The only argument that the writer has ever encountered in recommending shallow flangeways has been that they might be the cause of chipped or broken wheel flanges. Curiously, these arguments have never been advanced by men connected with the mechanical departments or by the manufacturers furnishing wheels under contract. In fact, discussions with them of the effect of this practice has indicated that the adoption of the full flange bearing makes an easier riding car, reduces the shock to the equipment and causes less damage to flanges than the non-flange-bearing intersection, or one with a shallow groove only at the intersecting flangeways. Some manufacturers of cast-iron wheels have advocated a change in the contour of wheel flanges to give a wider bearing on the bottom of the flangeway than that given by the standard wheels. This change was only presented as a theory and has never been tried out.

As noted in some of the other communications, the flange-bearing idea is an old one; in fact, it is so old that testimony in regard to the matter twenty years ago indicated that it was an obsolete practice. On the other hand, no doubt, the adoption of long approaches, giving a slight angle of impact at the point where the wheel flanges strike the bottom of the flangeway, has again made this practice useful and satisfactory. In conclusion I will say that there have been installed in Kansas City some thirty or forty crossings, built with flange bearings, and also a large number of frogs of various angles, and our experience with all of this work has fully justified our continuing its use.

A. E. HARVEY, Chief Engineer.

The Jitney and the Small Car

THE SOUTHWESTERN ELECTRICAL & GAS ASSOCIATION
DALLAS, TEX., June 29, 1915.

To the Editors:

I have been very much interested in the communication on "Jitneys vs. Light Cars" by Mr. Wilson of Mobile, Ala., in your issue of June 26.

Mr. Wilson is absolutely right in the first portion of his communication with regard to the profitable advantage of more frequent operation of cars or, to put it in another form, of more rapid service. The writer has proved this fact in times past in several small cities where the business section was only a comparatively few blocks from the residence section. He has taken non-paying properties and made them pay, largely by giving a more frequent, more rapid and a perfectly regular and dependable service, and the frequency of the service has been the main point of success. The instance which Mr. Wilson gives of the city where the revenue of the street car company had been reduced $1,000 per day by something over 350 jitneys, gives a case in point. In the five months during which the jitney has been in active operation, the revenue of this company has been reduced $150,000. Even allowing 33 1/3 per cent of this due to the hard times, the remainder, $100,000, if applied to the purchase or hire of small cars and their operation on a much shorter schedule on the lines peculiarly afflicted by the jitney, would have saved them a considerable portion of this loss, would have discouraged the jitney, would have had a strong moral effect on the public and, I fully believe, the balance sheet at the end of the year, under the above suggested operation, would have shown a profit instead of a loss.

One of the lessons that the street railways, and in some instances the shorter interurbans, must take to heart from the jitney experience is the desire of the public to "get there" in the shortest possible time and to keep moving while it is getting there. While the public does not like overcrowded cars and prefers sitting down to hanging to a strap, it will, as between the two evils, accept the discomfort rather than the delay, in nine cases out of ten. This applies particularly to the rush hours. The intermediate light traffic hours of shopping, visiting and pleasure automatically provide seats and prevent overcrowding, by reason of the lessened traffic, and at such times a slightly longer wait for the car is not liable to cause complaint or lessen traffic to any great extent. But during rush hours, especially during the business rush hours at morning, noon and night, the ability to get to business or to get home with a minimum of waiting time is the overpowering desire of a majority of those who travel in public conveyances.

In large cities the "skip stop" has been introduced with success, simply to accomplish the end of a more frequent service, and enormously expensive terminals

and loops in city centers have been built, not especially for the end of greater convenience, comfort and safety in handling the traffic, but that the final end of greater dispatch in the vital matter of getting the passenger to his destination without unnecessary delay might be accomplished.

It is true that the abandonment of the large cars may mean a tremendous loss to a great many railway properties, necessitating as it will the virtual scrapping of cars and equipment, the purchase of smaller and lighter cars and the employment of more trainmen, but the handwriting is on the wall that the public will have more frequent service, even if it has to patronize the jitney or its equivalent and put up with its discomfort, inconvenience and danger. When the street railways make it more convenient and more pleasant to ride than to wait or walk, then and then only will street railways obtain all the traffic that is possible, and at that time only will they put themselves in a position where they will not be open to some character of destructive competition such as the jitney.

Outside of this is the matter of public policy which affects the street railways not only directly in their car receipts but indirectly in unfavorable and onerous franchises and taxes and in inequitable accident damage verdicts. As I have said in a previous article, the best three assets of a public utility are "satisfied customers, a pleased public and contented employees." Satisfied customers tend to make a pleased public, and a pleased public helps to make and maintain contented employees. There are yet some few public utilities who argue that it is impossible to "satisfy the public," and where there is this opinion in a public utility there is always a manifestation of it in the service which that utility gives. The jitney has awakened the public to the fact that it needs—and can have if necessary—a more frequent service, which means a lessened wait for the conveyance and, as a rule, a higher rate of speed, or, at any rate, a lessened interval between the starting point and the terminus of the desired trip. If the street car company is wise it will imitate this feature of the jitney as fully as is possible. It may not be able to give as frequent a service as does the crowded line of jitneys; this the public will not ask, for the reason that this effect of the jitney carries the compensating disadvantages of irregularity of schedule and service and also a limited zone of service.

There is one point, however, in Mr. Wilson's communication to which little attention seems to have been paid and which is a basic weakness of the jitney, whether in small or large size. Events within the last few years have proved that no unit vehicle generating its own power can compare in efficiency of operation and maintenance with the central-station-fed vehicle. One of the claims of the jitney as against the street car has been that the jitney was an independent, self-contained and self-operating, trackless vehicle and that therefore the failure of one jitney did not cause the stoppage or delay of other jitneys nor was it possible for any physical cause connected with the vehicles to compel the total cessation of operation of all the jitneys in any one community. It was emphasized that the break-down of a street car greatly delayed the handling of the cars following, that the break-down of trolley lines stopped the operation of all cars on those lines, and that a break-down at the central point of power supply stopped the operation of every street car in the community. This is true to a certain extent, but proper inspection and maintenance of the whole system will reduce this, as it has reduced it in many electric railway systems, to a negligible minimum, and this favorable claim of the jitney is true only to the extent that the negligence of the electric railway company allows it to happen.

Any vehicle which generates and uses its own power does so in small and therefore inefficient units, and in order to do this it must have a myriad chain of intricate and delicate parts, which not only increase greatly its first cost but also increases its maintenance costs and its probability of break-down or of an increase of inefficiency.

The machinery which actuates the central-station-fed vehicle is, so far as the vehicle itself is concerned, the acme of simplicity and is built so as to give the minimum of maintenance. In nearly every case the machinery on central-station-fed vehicles, such as the street car, is in duplicate all the way through and while a failure of any one part of its propelling machinery may possibly cause a delay, it does not often cause a total cessation of operation, such as happens when the single vital part of a self-contained vehicle breaks down.

The initial economy and efficiency of generation in large units, the present economical method of supply from central station to vehicle and the present efficient propelling apparatus on the ordinary electric car all combine to give such a total economy and efficiency as is impossible with any present vehicle that generates its own power. It must be remembered that in the matter of efficiency "what is sauce for the goose is also sauce for the gander." Any efficient method of generating power in small units on self-contained vehicles can be applied even more efficiently in larger units in a central station, and the average or relative efficiency of large and small generating units has been proved to be such as more than to cover the costs of distribution from the large generating plant to the vehicle that it supplies.

This is the fundamental weakness of the jitney, whether as a small car or as a large bus, and this will be the fundamental weakness of Mr. Wilson's proposition as to self-power-generating vehicles to be used on tracks. When the interurbans first began to parallel steam roads, the gasoline and the gasoline-electric motor cars were pushed forward as being a means by which the steam roads could maintain themselves against the inroads of the electric interurban. With very few exceptions, this type of self-generating vehicle has gone to the scrap heap, has been relegated to little, non-paying branch lines, to locations where there are peculiar local conditions favorable to its use, or has been used for other purposes than comfortable, convenient and rapid transit such as is given by the electric trolley car. On the other hand, not only have the terminals of the larger steam roads done away with the self-power-generating locomotive of all types and kinds, but on their main lines, far away from cities, they are using central-station-fed traction vehicles over long distances, and the main reason for their doing this is economy and efficiency in the operating of the vehicle or tractor. If any further proof were needed on this point, it would be in the enormous increase in the use, in cities, of what is virtually a station-fed vehicle, viz., the storage-battery vehicle, which, as a rule, has proved its economy and efficiency for heavy work over the unit self-generating vehicle, and this notwithstanding the fact that it has an intermediate loss—the battery—to which the direct station-fed vehicle is not subject.

The final failure of the jitney as a competitor of the street car will occur through inefficiency and lack of economy alone, but that final failure might have been hastened tremendously if the electric railway companies had been prompt to take to heart the lesson of the jitney, viz., more frequent and faster service to the public.

H. S. COOPER, Secretary.

Equipment and Its Maintenance

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

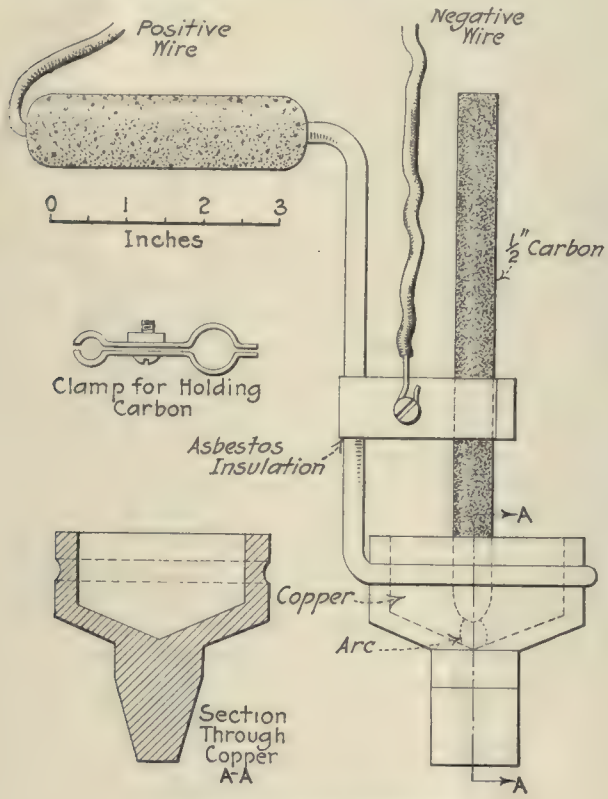
(Contributions from the Men in the Field Are Solicited and Will be Paid for at Special Rates.)

A Convenient Electric Soldering Iron

BY J. N. GRAHAM, MASTER MECHANIC ROCKFORD & INTERURBAN RAILWAY

The electric soldering iron illustrated in the accompanying drawing has been in use in the shops of the Rockford & Interurban Railway for the past year. It can be used on a 550-volt circuit and, when connected in series with an ordinary arc-headlight resistance, very good results are obtained in soldering the leads into commutators. It utilizes the heat of the electric arc in keeping the soldering tip at high temperature.

The body of the iron is made from a piece of 2½-in. round bar copper, turned to the form shown in the section. The point is planed down to ½ in. x 1 in. and is tinned like any ordinary soldering iron.



ELECTRIC SOLDERING IRON

The handle is made of ¼-in. round iron fitted in a groove turned in the body of the copper and bent in the form shown. At the upper end is a grip of wood or rubber used to protect the operator from electric shocks. An arc-light carbon, not less than ½ in. in diameter, is supported, as shown, from the handle by means of an adjustable clamp made of two pieces of flat iron held together by a small screw and nut. The clamp is insulated from the handle with sheet asbestos. It is adjusted so that it slides with sufficient ease to permit regulation of the arc length.

The lead wires are attached as indicated, one to the clamp by means of the screw and the other to the handle inside the grip. To protect the operator's eyes a washer of transite is slipped over the carbon and rests on the copper. The heating of the copper can be regulated by adjusting the length of the arc.

Preventing Kinking in Handling Wire from Coils

BY J. G. KOPPEL, ELECTRICAL SUPERINTENDENT OF BRIDGES, SAULT STE. MARIE, MICH.

A recent experience with conduit wiring has impressed upon the writer the importance of careful handling of wire in conduit work. The general principles of conduit wiring are well understood, but this experience may be of interest.

The wiring in question was installed about sixteen months ago in a large new carshop, and all wires were in conduit with suitable condulet outlets for lamps and switches. Recently the new wiring began to give

ILLUSTRATIONS SHOWING INCORRECT AND CORRECT METHODS OF PAYING OUT WIRE FROM A COIL

trouble, indicated by the blowing of fuses. The substitution of larger fuses did not cure the trouble and a few days ago, when an accidental ground occurred on the trolley wire inside the carshop, some of the circuits were burned out. On removing the damaged circuits several kinks with broken insulation were found, indicating careless work on the part of the wireman in drawing in the wires.

The writer's experience has shown him that very few wiremen know how to uncoil wire by hand, that is without some mechanical device. The following simple method permits the uncoiling of wire without kinks:

Referring to the illustrations, the first one shows the ordinary method of taking off loop after loop from one side of the coil with the resulting kinks as shown. In the second illustration the wireman is taking off loops without the least tendency to kink and it will be noted that he has the coil on his right arm. He unloops two loops of wire in this position, then shifts the coil to his

left arm and pays out two more, alternating in this way until the entire coil is paid out. By this process his wire gets slight twists alternately backward and forward, the twists neutralizing each other.

Hand-Brake Pressures

BY L. W. HORNE, CHIEF ENGINEER LORD MANUFACTURING COMPANY

It will probably be admitted generally that too little attention has been given in the past to the design and installation of hand-brake rigging. Many cars even now are equipped with hand-brake rigging that does not assure uniform pressure distribution among the brakeshoes. The brake rigging of some double-truck cars is so arranged as even to afford no assurance that the brakes will be applied on more than one truck under all conditions.

The condition of unequal pressure is readily understood by reference to Figs. 1 and 2. The arrangement of hand-brake rigging shown in Fig. 1 assures the application of pressure to both front and rear trucks, as it does not embody a fixed fulcrum, the lever simply being hung in a slotted guide. Considering the brake pressure to be delivered to the forward truck, let P represent the brake pressure required in the front-truck top rod, the lower one in the figure, and X the brake pressure necessary to be exerted at the hand-brake rod at the top in the figure. Then the formula is

$$X = P \div g/h.$$

The pressure delivered to the rear truck is, of course, greater, the formula being

$$X = P \div [(g + h)/h].$$

It will be noted that the lever arm g for the forward truck becomes $g + h$ when the pressure is transmitted to the rear truck.

The method of calculating the forces transmitted by the lever system shown in Fig. 1 is sometimes puzzling. A simple diagram, however, will show the manner in which the different fulcrums are obtained. Consider that the hand-brake pull rod has moved the lever so that the brakeshoes have been brought up rigidly against the wheels of the rear truck. The truck-rod connection to the lever then becomes fixed and the lever rotates around it as a fulcrum, applying the brakes on the forward truck. The leverage then obtained is g/h. Considering the rear truck, it follows that when the brakeshoes on the forward truck have been brought up rigidly against the wheels its brake-rod connection to the lever becomes a fulcrum. The lever then rotates about this fulcrum, applying the brakes on the rear truck, and thus is obtained the leverage $(g + h)/h$.

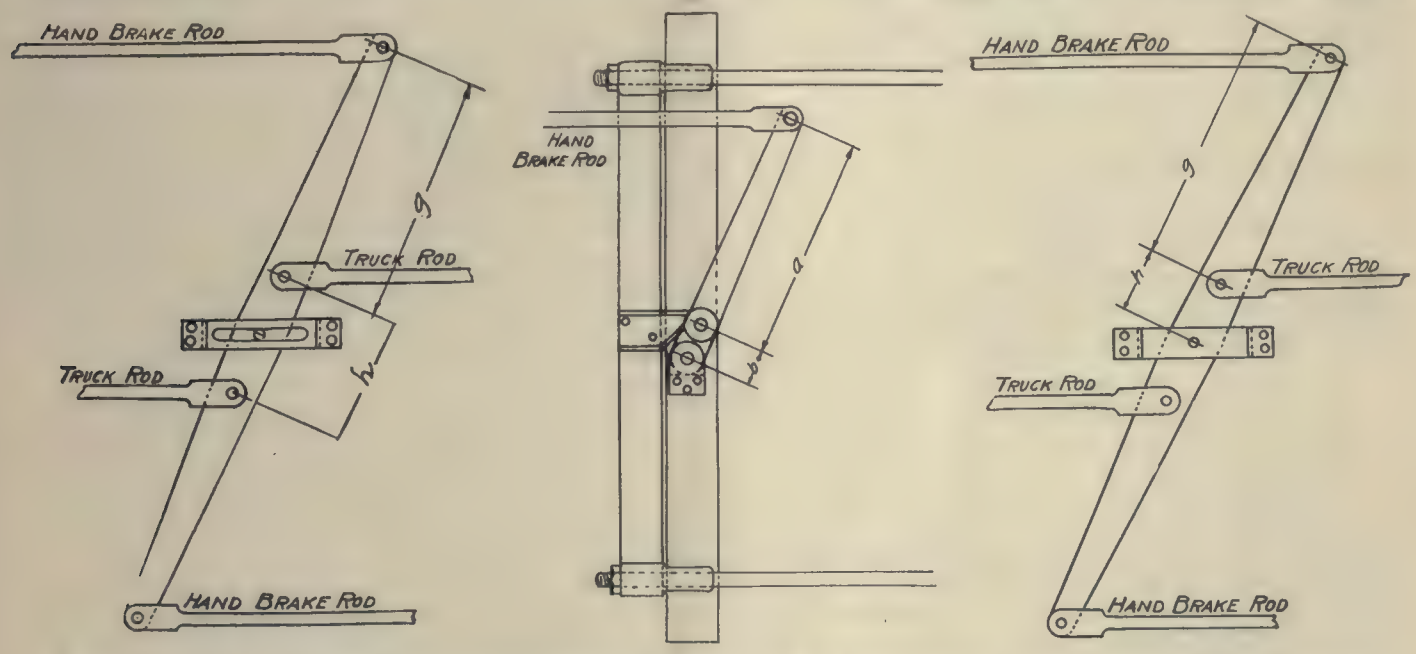
On single-truck cars the brake rigging shown in Fig. 2 is almost universally used. This also produces unequal pressures, having the same fault as the rigging shown in Fig. 1. The pressures on the forward and rear wheels are found respectively from formulas

$$X = P \div a/b \text{ and } X = P \div (a + b)/b.$$

Fig. 3 shows a most dangerous type of brake rigging sometimes used on electric railway cars. With this type of rigging, provided the shoe clearance and slack are not exactly the same on both trucks, the brakes are applied only on the truck having the least travel or slack. With this system of leverage a fixed fulcrum is used and, in applying the brakes, if one truck rod becomes rigid before the other, the lever has two fixed points and cannot rotate any farther. Consequently the brakes will not be applied on the other truck. The formula for computing the leverage developed by means of this rigging is

$$X = 2P \div [(g + h)/h].$$

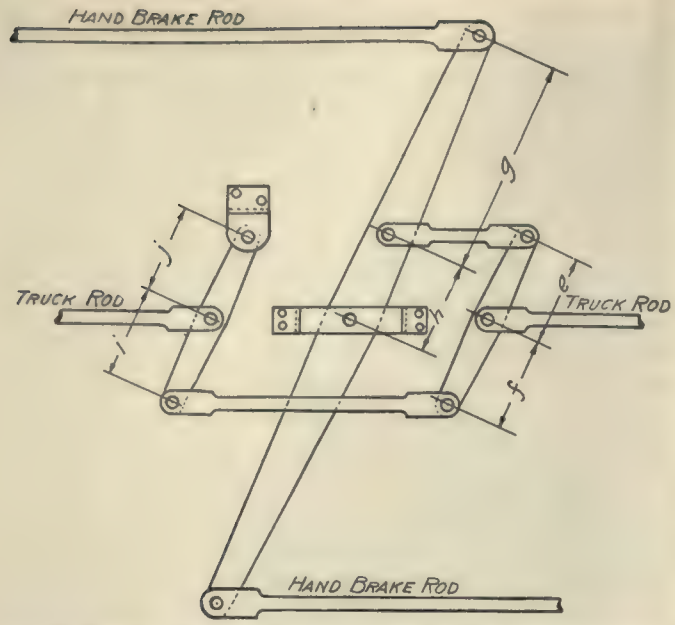
In comparing the formulas corresponding to Figs. 3 and 1 it is sometimes puzzling to understand why twice



HAND-BRAKE PRESSURES—FIG. 1—DOUBLE-TRUCK CAR-BODY BRAKE EQUIPMENT; FIG. 2—SINGLE-TRUCK BRAKE EQUIPMENT; FIG. 3—DANGEROUS TYPE OF BRAKE EQUIPMENT

This result is at variance with the correct theory of car retardation. A perfect arrangement of brake rigging should always provide a slightly higher pressure on the forward truck, because the car tends to overturn or rotate about the axis of the forward truck. This tendency is due to the centrifugal force exerted during retardation, which transfers part of its proportion of weight from the rear truck.

the force must be exerted in the hand-brake rod to give the same truck-rod pull as is obtained by the lever arrangement shown in Fig. 1. This is explained by considering the travel of the lever. It is well known that power and distance traveled are directly comparable. In Fig. 3 the brakes on both trucks are pulled up at once. Therefore each truck receives only half the force developed, and the travel of the lever is only that of



HAND-BRAKE PRESSURES—FIG. 4—BRAKE RIGGING GIVING PERFECT EQUALIZATION

the travel of one truck rod. In Fig. 1 each truck rod obtains the full pressure by means of a continued pull. In other words, one truck receives the full pressure and then the lever continues to travel until the other truck has also received the full pressure. The travel of the lever, therefore, is the total travel of the rear truck rod plus the total travel of the forward truck rod, or twice the travel of the lever shown in Fig. 3.

For cars not equipped with air brakes the system of hand-brake rigging shown in Fig. 4 produces exact equalization of pressures between trucks and absolute provision for applying the brakes on both trucks regardless of unequal travel and slack conditions. The formula for calculating the required brake pressure at the hand-brake rod for the rear-truck top rod is

$$X = P \div \left[\left(\frac{g+h}{h}\right)\left(\frac{e+f}{f}\right)\right],$$

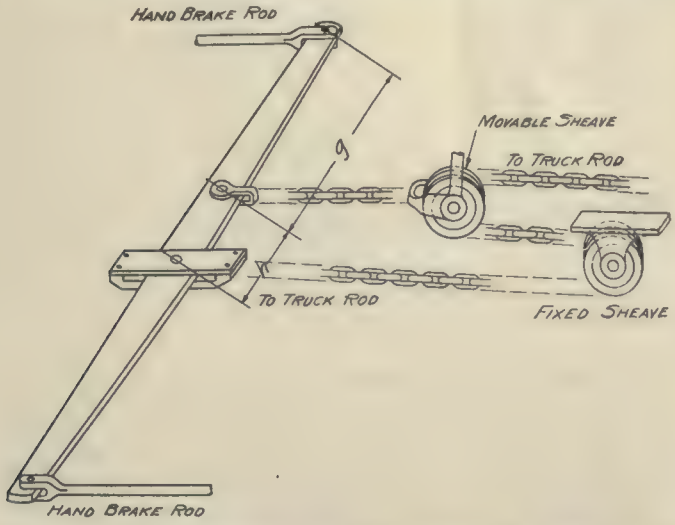
and for the forward-truck top rod is

$$X = P \div \left[\left(\frac{g+h}{h}\right)\left(\frac{e}{f}\,\frac{i+j}{j}\right)\right].$$

An arrangement of sheaves (Fig. 5) can also be used, which comprises the same type of rigging shown as Fig. 3, except that it has the advantage of affording exact equalization of pressures and the application of brake pressure to both trucks under all conditions.

When hand brakes are applied to air-brake cars it has generally been the practice to provide levers for multiplying the hand-brake power and a chain for operating the brake-cylinder piston, thereby applying the brakes to the trucks through the air-brake live and dead levers. By this method exact equalization of hand-brake pressure is obtained through the air-brake levers. However, some master mechanics favor a separate and independent brake rigging right to the truck levers. Their preference is based on good, sound judgment, as it not only provides against a failure of the air, but against the breakage of any of the air-brake pull rods. The practice of operating through the air-brake rigging, however, has the advantage of extreme compactness, and an additional safety measure has been provided by means of the stop device recommended by the Westinghouse Traction Brake Company. This device limits the travel of the live and dead levers in such a way that, should one of the top rods break, the lever can fulcrum against the stop, assuring a brake on at least one truck.

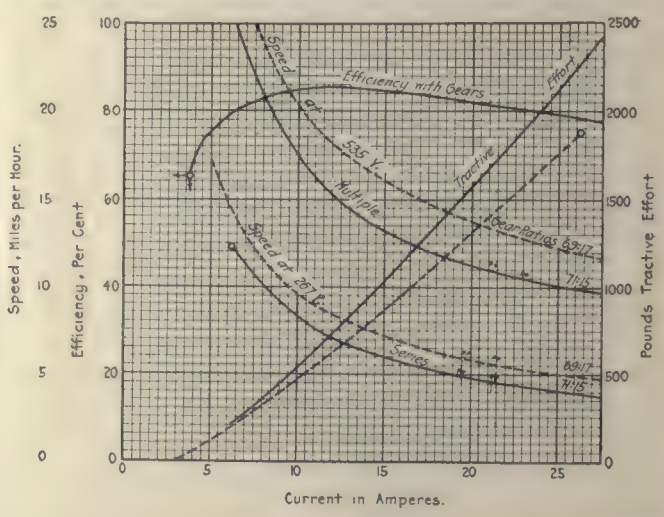
In designing hand-brake equipment and rigging for a car of known weight, it is desirable to obtain the maximum force possible in the hand-brake pull rod. Efficient hand-brake devices can be made very compact and can develop high power without the space required for the swing of long brake levers. For this reason the best proportion can generally be obtained by having the multiplying ratio transmitted through the car-body levers as low as possible, which results in short travel of the levers, the travel being directly comparable with the multiplying ratio. Economy of valuable space under the car is also thereby effected, allowing room for the many devices now being added to modern car equipment.



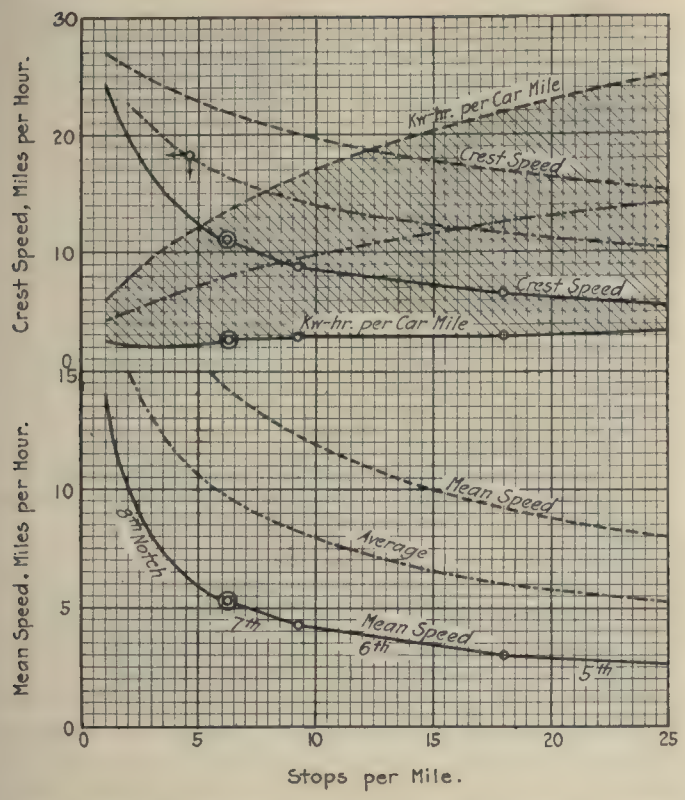
HAND-BRAKE PRESSURES—FIG. 5—RIGGING EMBODYING SAME PRINCIPLE AS THAT SHOWN IN FIG. 4

Effect of Gear Ratio on Operating Economy

In the sixth annual report of the Board of Supervising Engineers, Chicago Traction, the results of a study of a change in gear ratio are given. These results are shown in the accompanying curves. The study was made on a change in ratio from 69:17 to 71:15 on the standard 1908 Pullman car of the Chicago Railways, weighing 30 tons. Fig. 1 shows the characteristic motor curves for the two gear ratios, the efficiency being practically the same. On the assumption of an accelerating rate of 1.65 m.p.h.p.s. and different periods of coasting, the operating results obtained with the new



GEAR RATIO AND OPERATING ECONOMY—FIG. 1—CHARACTERISTIC CURVES OF CHICAGO SURFACE LINES MOTOR



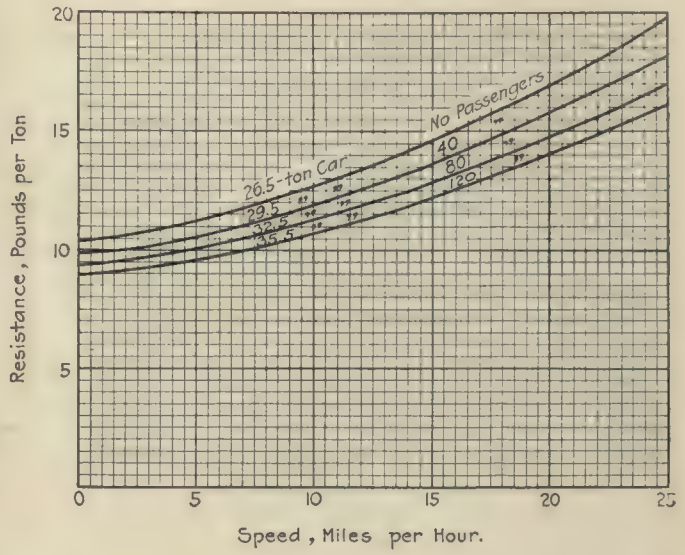
GEAR RATIO AND OPERATING ECONOMY—FIG. 2—SPEEDS AND ENERGY CONSUMPTION WITH DIFFERENT COASTING PERIODS

gear ratio are shown in Fig. 2, the speeds given being running speeds with no allowance for stops. Assuming ten-second stops at intervals of 528 ft., or ten stops per mile, as typical of the service on heavy streets, the following results were indicated by the study:

1. With no coasting, a schedule speed of about 9 m.p.h. cannot be exceeded without increasing the acceleration rates assumed. 2. The maximum or crest speed of 20 m.p.h. is necessary to reach this average speed. 3. With part coasting and part braking, the relation between maximum and average speed is in general of the same character, i.e., with a given maximum of crest speed the schedule speed is limited and cannot be raised without increasing acceleration rates. Considering the present average schedule speed of Chicago cars, i.e., 9 m.p.h., it appears from the average curve of Fig. 2 that a crest speed of fully 18 m.p.h. must be reached and stops limited to five per mile or their equivalent as an average, if the rated capacity of the equipment is not to be exceeded.

In general, from the results of the study, it appears that the new gear ratio is better adapted for the heavy Chicago traffic under the assumed conditions for the following reasons: 1. The maximum crest speed of the cars is reduced by about 13 per cent. 2. A mean power saving of 6.6 per cent may be realized within the usual range of stops. This can be seen in Fig. 3, where the ratio of power consumption between new and old gearing is plotted against stops per mile. 3. The rate of acceleration on subnormal voltage may be materially increased without dangerously overloading the motors. This is particularly advantageous in the congested districts as a means of increasing schedule speeds.

The report also calls attention to the effectiveness of field control, the principal advantage of which is in providing a flexible gear ratio, changeable electrically



GEAR RATIO AND OPERATING ECONOMY—FIG. 4—TRAIN RESISTANCE CURVES USED AS THE BASIS OF PREVIOUS CALCULATIONS

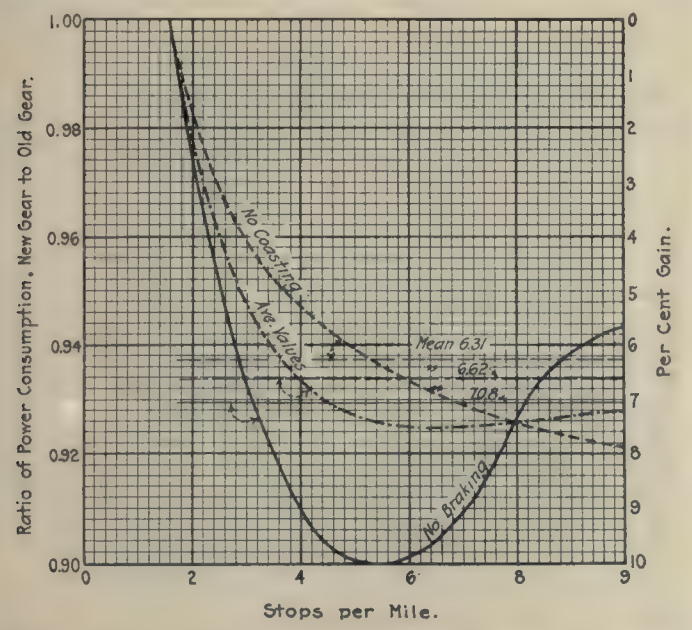
through the operation of the controller. The gear ratio suitable for field control is given as 69:15, or 4.6, as compared with 71:15, or 4.73, for the revised rheostatic control, and 69:17, or 4.055, with the rheostatic control then in use.

In calculating the schedules on which the above conclusions are based, the board employed the results of resistance tests made by the Chicago Railways in 1912, using standard passenger cars and the dynamometer or drawbar-pull method. These results are shown in Fig. 4. The tests were made upon a car weighing 26½ tons empty and loaded to 35½ tons, that is, with 120 passengers. The curves represent the resistance at constant speed, it being found that during acceleration the resistance is considerably higher, especially at low speeds. The resistances shown are much lower than are usually given for cars of this type.

The formula representing them is based upon the Armstrong train-resistance formula with the constants revised to fit the results of these tests. It is as follows:

$$R = \frac{53.5}{\sqrt{W}} + 0.05\,S + \frac{0.00877 \times A \times S^{1.7}}{W},$$

where R = car resistance at uniform speed in pounds per ton.



GEAR RATIO AND OPERATING ECONOMY—FIG. 3—CURVES SHOWING RELATION OF STOPS PER MILE AND SAVINGS DUE TO CHANGE IN GEAR RATIO

W = weight of car in tons.
S = speed in miles per hour.
A = head end area square feet (100 sq. ft.).

The report calls attention to the fact that there is general acceptance of a form of curve starting at zero speed with a certain static friction, and increasing more rapidly than the speed due to head or wind resistance and track friction. But none of the empirical curves for free-running train resistance recognize the fact that the resistance during acceleration is considerably greater than indicated by the curve of free-running resistance, and that the curve of total drawbar-pull or resistance is very high at the start, minimum at a moderate speed and again rises at higher speed. Hence in the preceding study the resistance during acceleration was assumed as high as 22½ lb. per ton, nearly double that found in free running.

Although these data were obtained from actual dynamometer tests, the great diversity of opinion and results among various investigators suggests the necessity for further analysis, especially differentiating between train resistance during acceleration and during free running.

Effect of Car-Wheel Diameter on Motor Heating

In a recent publication of the Westinghouse Electric & Manufacturing Company appears a continuation of the discussion of the effects of the size of wheel on motor heating begun in a series of articles in the ELECTRIC RAILWAY JOURNAL, to which the writer referred. These articles appeared in the issues for Oct. 3, 1914, page 622; Oct. 31, 1914, page 1014; Nov. 28, 1914, page 1203, and Dec. 19, 1914, page 1344. After referring to the discussion in the ELECTRIC RAILWAY JOURNAL the writer of the article proceeded as follows:

As an example of the effects of differences in wheel diameter, the case of a car which has wheels 30 in., 30½ in., and 31 in. in diameter, equipped with typical 37.5-kw. (50 hp.) motors, has been considered and will show the difference in the load and heating for each of the motors driving the three sizes of wheels.

From the speed curves, Fig. 1, the amperes load taken by each of the motors for any given speed may be easily determined. For example, if the car is operating at 15 m.p.h., the motor on the 30-in. wheel is drawing 75 amp., and the motor on the 31-in. wheel is drawing 81½ amp.

From this difference we have constructed curve No. 2, Fig. 2, which shows the per cent difference in the loading carried by the two motors based on the amperes in the motor driving the larger wheel. Due to the difference in amperes taken by the motors there is naturally a difference in the heating resulting therefrom. Curve No. 1, Fig. 2, shows the per cent difference in the heating between the motors driving the 30-in. and the 31-in. wheels, based on the heating in the motor driving the 31-in. wheel. At 25 m.p.h., which is the approximate free running speed, this heating will be 5.5 per cent less in the motor driving the smaller wheel than in the motor driving the larger wheel.

When the car is accelerating, these motors will draw approximately 90 amp., and when the resistance is all cut out of circuit, the speed will be approximately 14.5 m.p.h. Therefore, the load on the motor on the 30-in. wheel is 7.3 per cent less than on the motor on the 31-in. wheel, and the heating is approximately 12 per cent less. It may be seen from the shape of the curve that when the motors are heavily loaded the difference in heating may be very great.

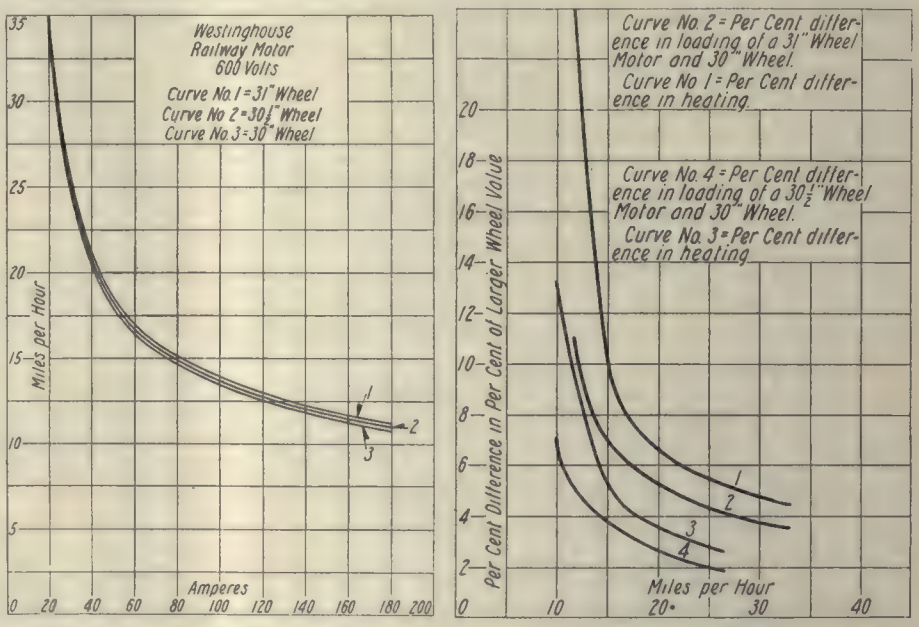
Fig. 2 also shows the difference in the load and heating between motors on 30-in., 30½-in. and 31-in. wheels.

These curves were worked up assuming the motors had identically the same speed curves, but in commercial production, due to the variation of materials, machining, etc., the speeds of different motors may vary as much as 5 per cent.

If the motor which is mounted on the larger wheel rotates at a higher speed for the same amperes than the motor on the small wheel, then the difference in loading will be greater than shown on these curves.

If the service is such that the motor is accelerating during the greater part of the time, the difference in wheel size permissible will not be so great as when it is operating in a service which is largely made up of running at high speeds with few accelerations.

It is not the purpose of this article to state what wheel-size variation is allowable, because this depends entirely on the shape of the speed curve, and particularly on the service to which the motor is subjected. It is evident that when the motors are running comparatively cool a certain difference in heating between two motors on a car is not so objectionable as with the motors worked to the limit. This means, in general, that it is not so necessary to be particular with reference to wheel sizes where the motors are running cool, while with motors running hot it may be best economy to keep the wheel sizes very nearly alike.



WHEEL DIAMETER AND MOTOR HEATING—FIG. 1—SPEED CURVES FOR DIFFERENT DIAMETERS; FIG. 2—DIFFERENCES IN CURRENT AND HEATING

The approximate curves shown are given merely as an aid in deciding for each individual case the maximum difference allowable.

A recent census of the trainmen of the Louisville (Ky.) Railway showed that the men had been in the service of the company as follows: Fifteen for more than twenty-five years; forty-one for more than twenty years; forty-seven for more than fifteen years; eighty-four for more than ten years; 385 for more than five years; fifty-five for less than one year.

A Convertible Car for General Service

The Burlington (Vt.) Traction Company has recently placed in service a type of convertible car that has numerous features of advantage for general service. The design is standard with the builders, the J. M. Jones' Sons Company, Watervliet, N. Y., and it is claimed that the car probably constitutes the nearest approach to a single universal type for surface operation that has yet been attempted.

The special features, aside from the fact that the design provides an open car in summer and a closed body in winter, thus eliminating double equipment, consist in the low window sills, the absence of wall pockets that ordinarily collect rubbish, the maximum seat length and aisle space, the low platforms, and the inclosed platforms, preventing accidents to passengers and conductors, whether used as a summer car or as a winter car.

For the Burlington car, the general dimensions are as follows:

Length over all	45 ft. 0 in.
Length over corner posts	32 ft. 0 in.
Extreme width	8 ft. 5 in.
Height from rail to trolley board	11 ft. 10 in.
Weight fully equipped	45,000 lb.
Seating capacity (exclusive of platforms)	58

The car body is constructed upon a steel underframe with steel-plate girders at the sides. The side posts are made of ash, but the roof sheathing is of sheet steel. The interior finish, in general, is of cherry. The interior equipment includes AA-DT American sheet glass, Globe ventilators, Curtain Supply Company's curtains, Heywood Brothers & Wakefield rattan-covered seats, solid-bronze polished trimming, folding platform doors and steps with Consolidated fixtures, Consolidated buzzers and heater equipment with thermostatic control, and International registers. Taylor trucks with 4-ft. 10-in. wheelbase and 34-in. wheels are installed, and with these is a four-motor equipment of Westinghouse 101-B motors.

The detailed weights of the various pieces of apparatus that enter into the construction are shown in the following table:

Car body	17,500 lb.
Trucks	12,500 lb.
Motors	10,800 lb.
Brakes and control	3,000 lb.
Doors and steps	900 lb.
Heaters	300 lb.
Total	45,000 lb.

It will be noted from one of the accompanying illustrations of the car that there are no hand straps at the ends of the car, and that the longitudinal end seats are unusually short, seating only two passengers. The idea involved is that, by eliminating the hand straps, standees will move forward to a point where they can reach the handholds on the backs of the transverse seats, and in this way the ends of the car will be left clear for entrance and exit.

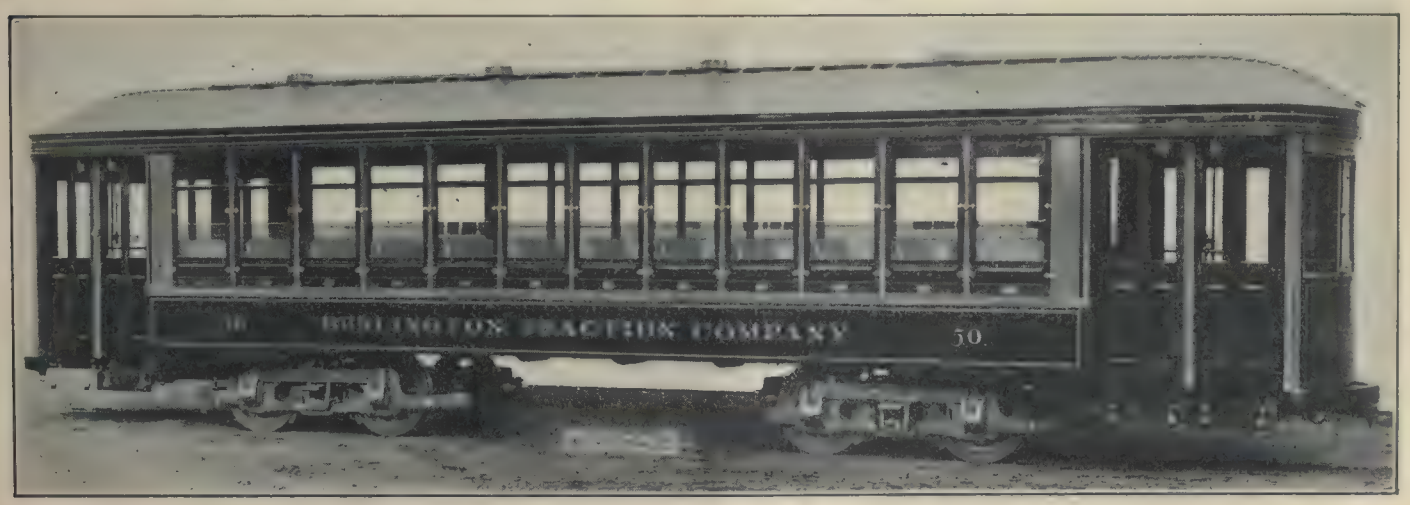
INTERIOR VIEW SHOWING STATIONARY SCREENS IN WINDOWS

Tank Lifters for Small Oil Switches

Oil-switch tank lifters are a great convenience, particularly in stations where a large number of switches are installed, and although a tank with oil for a comparatively small switch is not especially heavy, the character of the load makes it somewhat cumbersome for one man to manage. The result of this is that often the oil-switch contacts are not inspected as regularly as they should be to insure the most satisfactory operation.

The tank-lifting arrangement, which is manufactured by the General Electric Company and illustrated on page 74, provides a very simple and easy means for lifting quickly an oil-switch tank either up or down through the entire distance between the switch frame and the floor. The lifter is made in two widths, one for single and the other for double-throw switches, and these widths differ only in the lengths of the three rods that join the two pairs of parallel operating arms, this being necessary owing to the differences existing in the dimensions of the tanks.

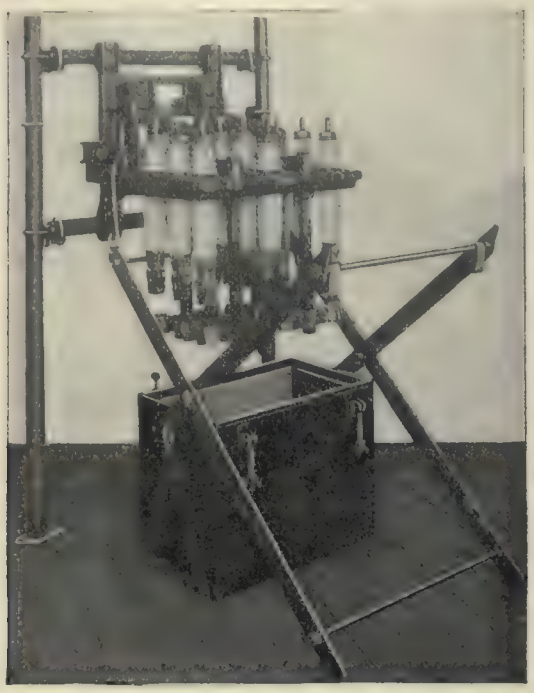
To fasten the tank lifter to the switch frame two hooks attached to the inner ends of the longer pair of



CONVERTIBLE CAR WITH SASH IN PLACE FOR WINTER SERVICE

operating arms are placed over the ribs of the switch frame, the operating arms are raised and the tank supports fitted under the tank. Then the wing nuts that secure the tank to the frame are turned to unfasten the tank, and the outer ends of the long arms are lowered to the floor. Finally two catches on the cross-rod between the inner pair of operating arms are released, and these arms are allowed to rise until the tank reaches the floor.

The tank supports are separate from each other and



VIEW OF TANK LIFTER FOR SMALL OIL SWITCHES

attach to the tank by continuations of the two equal sides of each strap-iron triangle, which are bent upward to fit over the rim on the bottom of the tank. Each support is removed from a tank by lifting an end of the tank a few inches from the floor and sliding the support from under.

To place the tank on the oil switch, the operation as described is reversed, the time required for the process being practically negligible.

All-Steel One-Man Car

Some months ago the Marshall (Tex.) Traction Company, as noted in the ELECTRIC RAILWAY JOURNAL for March 27, ordered three all-steel one-man cars from the Cincinnati Car Company on a forty-five-day guaranteed delivery. The cars left Cincinnati on the date agreed and are now in service on the Marshall Traction Company's line. They possess a number of unique features, prominent among which is the all-steel construction notwithstanding their small size.

The side girders are made of ⅛-in. steel plates to which the side sills of 3-in. x 5-in. x 3/16-in. angles are riveted. From the side sills pressed-steel channel crossings of ⅛-in. steel plate are supported and these carry the flooring. All body posts are formed from continuous steel tee bars 1½ in. x 2 in. x 3/16 in., these members extending from side sill to side sill and forming the roof carlines. Vestibule corner posts are made of No. 12-gage sheet steel pressed into a box section, and the roof is covered with No. 18-gage sheet steel riveted direct to the steel carlines. The outside of the vestibule below the sash is covered with ⅛-in. sheet steel pressed at the top to form the window sill, and the letterboard for both body and vestibule is also a ⅛-in. steel plate, both top and bottom being shaped to receive respectively the canvas molding from the roof and the top sash.

The floor of the car is formed of two layers of wood applied longitudinally with the car body, and the interior finish, such as sash, doors and molding is made of ash. Outside of this, however, the construction is of steel throughout. No headlining is installed, the roof being covered on the outside with 1-in. thickness of compressed cork that is cemented to the steel, the cork, in turn being covered with No. 8 canvas secured to a wooden molding on the letterboard and bound with 1½-in. beveled edge iron. The wainscoting below the window sills also is made from compressed cork 1 in. thick and cemented to the steel side plates, and is covered with 1/16-in. linoleum. The vestibule between the floor and the windows is sheathed in the same manner.

A prominent feature of the car is the very high grade of painting that has been followed throughout, this being in accordance with the Cincinnati Car Company's standard system. The smooth finish is especially noticeable in the white enameled ceiling shown in one of the accompanying views. This has eliminated abso-

EXTERIOR AND INTERIOR VIEWS OF MARSHALL TRACTION COMPANY'S ONE-MAN CAR

lutely any objection to the absence of headlining on the grounds of appearance, as the exposed carlines give an impression of panelling that is exceedingly attractive. An air space under the steel roof sheathing is, of course, made unnecessary by the cork insulation on top of the roof.

The car seats thirty-two passengers and is 33 ft. 5 in. long over all. However, the weight of the car body, complete with all details but exclusive of the car-body electrical apparatus and trucks, was guaranteed not to exceed 10,000 lb. Single Brill trucks are used, these weighing 6800 lb. when equipped with two Westinghouse 307 motors and double-end control. This gives a total weight of 16,800 lb. for the car.

The following equipment specialties were furnished: Consolidated electric heaters, Hale & Kilburn seats, Hunter destination signs, Pantasote curtains, Rico sanitary strap covers, and Peacock brake mechanism with Cincinnati ratchet and pawl. Combination ventilator registers and lamp fixtures, sash locks, weather stripping, push buttons, and sand boxes were supplied by the Cincinnati Car Company.

The car body is fully inclosed and of the double-end type, the car having been designed for one-man operation. There are, however, two sets of folding doors and a stationery step on each side of the vestibule so that the car is suitable for two-man operation in case this is desired. The doors are normally under the control of the motorman by suitable operating mechanisms, and a removable division rail is provided in each vestibule to separate the entering from the exit passengers.

The general dimensions are as follows:

Length over all	33 ft. 5 in.
Length over corner posts	21 ft. 6 in.
Height, rail to trolley board	10 ft. 9 in.
Extreme width	8 ft. 2⅛ in.
Step from rail	15¾ in.
Step to platform	13 in.
Step to car floor	8⅝ in.
Door opening between posts	3 ft. 11⅜ in.
Width of seats	37 in.
Width of aisle	20 in.
Side post center	30 in.
Seating capacity	32
Size of wheel	33 in.
Wheelbase	8 ft. 6 in.
Total weight of car	16,800 lb.

Effect of Zinc Chloride on Timber Strength

Some interesting results of a study of zinc chloride as a preservative of lumber were presented recently in a thesis by Alfred H. Clarke, at the Massachusetts Institute of Technology, Boston. The author pointed out that the main objection to the use of the cheaper grades of pine for structural purposes is the susceptibility of such lumber to destruction by dry rot. The seeds of the rot fungi are microscopic and may exist unobserved in new wood. If they are left unhindered they may, under proper atmospheric conditions, develop rapidly and injure the whole structure of the wood and be disastrous to the building. The usual means of prevention is by filling the wood with a poison which destroys the food of the fungi. Zinc chloride, often used for this purpose, is cheap, easy of application, and efficient as a rot destroyer. Under ordinary conditions it has not been thought harmful, but it has also been argued that under the conditions of temperature and humidity that favor dry rot, the zinc itself may impair the strength of the timber.

The method followed was to treat small sapwood specimens with the desired amount of the salt by immersion in a bath of weak solution, then to consider and observe in fairly large sets the wood so treated for strength in various ways, moisture content, etc. Comparisons were also made with untreated wood. A temperature of 150 deg. Fahr. was maintained for several days. The moisture content was found to be about the same in treated and untreated woods, but the breaking strength of the treated pieces was only 38 per cent of the untreated specimens. The tests indicated the desirability of further research along this line.

Tearing Up Pavement at 500 Ft. per Minute

Rooting up granite-block pavement between the rails at the rate of approximately 500 ft. per minute is the startling result obtained by the use of the pavement rooter invented by Charles H. Clark, engineer maintenance of way Cleveland Railway Company, and described on page 1346 of the ELECTRIC RAILWAY JOURNAL of June 13, 1914. The device consists of a heavy steel

VIEW OF ROOTER IN ACTION

plow casting mounted beneath a substantially built carriage which weighs complete approximately 11 tons. In the particular instance shown in the three accompanying illustrations, the total time required to set the plow in position for beginning the work, attach it to the motor car and plow up 1475 ft. of granite-block pavement between the rails was twelve minutes. The actual plowing time for this length of track was three minutes. Since this rooter accomplishes its work so

VIEWS OF TORN-UP PAVEMENT

quickly, pictures of it in action have been difficult to obtain. For the information of track and roadway engineers one need not dwell upon the saving in labor thus effected, only two men with the plow and the crew on the motor car being needed. Immediately after the pavement is torn up it is necessary for a small crew of men to make the street crossings safe, but this would be necessary in any case, hence this gang's time is not chargeable to the cost of tearing up the pavement.

Quickly Detachable Busbar Tap

The busbar tap shown in the accompanying illustration is one of the cable-connecting devices made by the Fargo Manufacturing Company which were mentioned in the ELECTRIC RAILWAY JOURNAL of June 26. This is reported to make a material current saving on account of its positive contact, as it makes a practically welded joint, the tap wire being forced against the busbar with almost any desired degree of pressure. This is accomplished merely by tightening the screw nut which holds the tap wire firmly through the cone-shaped grips fitting inside of it.

COMPRESSION-TYPE BUSBAR TAP

The connection naturally has great strength and it is very easily installed, eliminating any necessity for using solder or bolted clamps. It can be disconnected with equal facility so that the work of cutting out a transformer, for instance, can be accomplished in a couple of minutes. This ease in handling obviously makes the device a great money saver in both the central station and the substation. In fact, wherever electrical taps are installed either permanently or for temporary work, this form of connection can be used with invariable success.

Track-Trench Excavating Machine

One operation to complete the track trench ready for ties, rail and ballast, is the result obtained by a special type of excavating machine that is operated by the General Engineering & Constructing Company, Rockford, Ill. This was designed particularly for excavating street railway track trenches in any width up to 9 ft., and depths up to 36 in. may be excavated in one operation. A roadbed true to grade is easily regulated, the depth of the trench being controlled by the boom operator who varies the depth of the cut as shown by an indicator on the machine.

This indicator points to the true grade which is established by a line and stakes set beside the trench. During the process of excavation the machine will deposit the spoil on either side of the trench or cast it into dump wagons in the street beside the trench. The ability of the operator to regulate this machine to cut a trench true to line and grade, and at the same time leave the trench practically clear of loose material, makes unnecessary any leveling of the finished trench.

TRACK-TRENCHING MACHINE—VIEW OF MACHINE IN OPERATION

TRACK-TRENCHING MACHINE—VIEW OF INTERVAL BETWEEN TRACK AND EXCAVATING GANGS

In a contract recently completed for the Rockford & Interurban Railway, a 20-in. trench, 8½ ft. wide, was excavated at a rate of approximately 500 ft. a day. The material removed was a sandy loam paved with macadam. Before beginning the excavation the track was removed from the street with jacks, and the trencher followed this work so closely and was in turn followed by the track-laying gang, that a maximum distance of only 300 ft. was left between the point where the old track left off and the new track began.

Experience with various kinds of materials has demonstrated that the machine will successfully and economically excavate any of the usual composite materials found in city streets. If the spoil is to be used again for ballast it may be cast on one side of the trench, leaving the other side clear for traffic and track operations. When only a part of the spoil is to be used for future work, that which is to be hauled away may be run into dump wagons as the work progresses. In case all the spoil is to be removed from the street, the waste time of teams is minimized as the wagons are loaded rapidly and continuously after the teams have been properly spaced. The continuous flow of excavated material from the machine to the wagon makes it possible to load the average dump wagon in about two minutes, and experience has shown that it is possible also to obtain about ¼ yd. more load per wagon with machine-loaded material than with material loaded by hand. In the two accompanying illustrations the excavating machine and the interval between the machine and the track-laying gang are shown.

The recent talk by H. C. De Camp, Cincinnati, to two groups of trainmen of the Louisville (Ky.) Railway, is the first of a series which Mr. De Camp will deliver during the year. No meetings will be held during the hot weather. The company will resume the educational work in the fall, when Mr. De Camp will discuss the equipment of the street car. Other speakers will be heard from time to time. The meetings will be held at irregular intervals, according to the plans which the company has announced.

News of Electric Railways

TOLEDO FRANCHISE CONFERENCE

The conference between the franchise committee of the City Council of Toledo, Ohio, and Henry L. Doherty and other representatives of the Toledo Railways & Light Company on July 2 was brief and as a consequence not much was accomplished. Another conference was arranged for July 7.

The tentative draft as it stood on July 2 provides that the municipal ownership ordinance, passed by a vote of the electors on Aug. 4, 1914, shall not be changed, altered or affected in any respect by the provisions of the new ordinance, nor shall the new ordinance be construed as replacing the municipal ownership ordinance. This ordinance, it is expected, will state that its terms may be exercised whenever the city is in position to purchase the property.

Section 7 of the new ordinance provides that the city may buy the company's property under the provision of the referendum ordinance, the value to be based upon an appraisal which shall be determined by arbitration. The city must give the company notice twelve months before it expects to exercise this privilege and the purchase is to be settled by a referendum vote. The right to purchase may be exercised within sixty days after a referendum election, if the majority of voters favor the purchase.

It was agreed that when a question arises in regard to the fare to be charged, the rate in effect at the time shall be continued until the matter is settled by a court of common jurisdiction. Attorney Thomas H. Tracy suggested that if it is found that the fare was not sufficient to meet requirements provided in certain sections of the franchise, the loss should be made up to the company. While the matter was not definitely settled at the conference on July 2, the committee seemed inclined to concede this contention. Mr. Tracy also insisted that questions of efficiency in operation should be left to arbitration.

ROCHESTER CONNECTING RAILROAD

The Rochester Connecting Railroad has applied to the Public Service Commission of the Second District of New York for a certificate of public convenience and necessity for its 2½ miles of line in the outskirts of Rochester. The company recites in its petition its connection with the Buffalo, Lockport & Rochester Railway, an electric line, which is also connected with the proposal to build a new international bridge across the Niagara River and to connect it with the Buffalo, Lockport & Rochester Railway by a new line from Niagara Falls to Lockport. The New York Central Railroad has objected to the granting of a certificate to the Niagara Falls and Lockport line. The eastern end of the Buffalo, Lockport & Rochester Railway, through the proposed Rochester Connecting Railroad, is to be connected with the Pennsylvania Railroad and the Erie Railroad at Rochester.

It was said at a recent hearing before the commission for a certificate for the western connecting link that this, with the new bridge, would give the Pennsylvania Railroad access not only to the rich territory of the Buffalo, Lockport & Rochester Railway, but also would afford a connection over the new bridge with the Canadian transcontinental lines. The project is backed by men prominent in electric railway affairs in western New York, including E. G. Connette, president of the International Railway, Buffalo, and the petition for the Niagara frontier link of the new road is supported by petitions of the local authorities, boards of trade, and prominent manufacturers. The New York Central Railroad in its opposition to the propect maintains that the territory is already supplied, if not over-supplied with railroad facilities. It says that the present railroad bridges into Canada are of a capacity sufficient to care for the business of many years' growth, and that to allow competition in this territory would be ruinous to its own interests as well as to the business of the new road. A hearing has been held before the commission on the Niagara link and the question of the Rochester connection will be heard within the next few weeks.

THE CHICAGO ARBITRATION

Employees Complete Presentation of Evidence—Railway Begins with Testimony of President Busby

Day and night session are being held by the arbitrators selected to pass upon the differences between the Chicago surface and elevated railways and their employees. The employees completed the presentation of their case with the examination of President Mahon of the Amalgamated association. The railway opened its case with L. A. Busby, president of the Chicago Surface Lines.

The hearing of June 30 was largely devoted to taking the testimony of employees regarding wages and working conditions. With each witness counsel for the employees emphasized the point that one year of training was sufficient to warrant paying a motorman the maximum wage. One witness stated that he knew of no skilled trade where the men received the maximum wage in one year unless it was the hodcarriers. This witness said that hodcarriers worked only about eight months of the year and he was not sure that men of this trade received more pay than motormen. Joseph Riordan, a motorman on a supply car, contended that his duties were more difficult than those of a regular motorman. For that reason he should receive the same pay and be of the same grade as the motormen in the train service. In cross-examination, however, Mr. Riordan stated that most men who went from the supply-car service to the train service did not like the work and quit. According to the witness motormen on supply cars would not be credited with seniority when they entered the train service.

The examination of motorman Myles Callaghan showed that he had a split run, from 6 a. m. to 8 a. m., and then from 1.40 p. m. to 9.30 p. m. He admitted, however, that he could have chosen a run with fewer consecutive hours which would have paid as much as the one he had selected. Practically all the other motormen witnesses had objected to smoking on the platform, but Motorman Callaghan advised that he had not suffered. It was very easy to ventilate the vestibule. The witness admitted that the company purchased the uniforms of new men in cases of emergency, and that the cost of uniforms had decreased. Ten years ago the extra men averaged four days a week. At present they average at least five days a week. The men were permitted to select the system by which runs were picked.

Maurice Lynch, assistant financial secretary of the union, was examined regarding the speed of cars. He stated that this was computed from one end of the line to the other, and included delays. On a line of fifty runs, each run having ten trips, or a total of 500 trips, a minute taken off each trip would save the company 1500 minutes. Also, if one hour was required for a round trip on a three-minute headway, and the time was reduced to fifty-seven minutes the company would save four men, or $12.80 a day. High speeds required greater alertness on the part of the motormen, took cars off the line, and threw men back on the seniority list.

Ordinary common sense, a little clerical ability and honesty were essential for a man to be a good conductor. Concerning unemployment in other trades, bricklayers worked about 75 per cent of the year, structural iron workers 75 to 80 per cent, plasterers 75 per cent, lathers the same, and steam fitters continuously. Trainmen in the street railway service could not work the entire year.

Lawrence D. Bland, editor of the *Union Leader* since 1905, presented a table of increases in the prices of articles of food since 1907.

On July 2, W. D. Mahon, president of the Amalgamated Association, outlined the history of the organization and the railway industry. More than 200 locals had contracts with the companies. He believed the responsibility of motormen and conductors was greater than that of any men in any other form of transportation. The financial statements of companies in the United States showed a steady increase in gross income. In 1902 one out of 18,000,000 passengers was killed, and in 1907 one out of 13,000,000. In the last three years in Chicago, twenty-two trainmen were

killed on the surface lines, and eight totally disabled. The industry owed the employees a living when they became too old for service. Mergers resulted in a reduction of the cost of management. In 1892 there were six companies in Chicago. Now there was only one. The reduction in the expense of supervision should make it possible to take better care of the men. The men were not properly provided for anywhere in the street railway industry in this country or Canada. The arbitrators should consider only local conditions. When Mr. Mahon had finished, counsel for the employees announced that he had completed their side of the case.

L. A. Busby, president of the Chicago Surface Lines, took the stand on July 5. He outlined his ten years' connection with street railways, and explained briefly the development of the graded scale up to 1909, when the present five-year spread was established. Mr. Busby introduced exhibits showing the average monthly wages of regular, extra and carhouse men for May, 1915, for all employees to be $74.20 a month. With $3.10 a month added as the cost of free transportation to the men, the general average of all men in the service was $927.60 a year, with the average for high-rate men $1,011.60 a year. Other statistical exhibits were introduced to show that Chicago conditions were better than those in other cities as regards fall-backs, pull-outs, turn-ins, accident report time, night cars and receiver's pay. An exhibit was also introduced showing that bonus and dead-time allowances cost the company 3,255,540 man-hours a year, or $1,011,786. This resulted in the Chicago trainmen receiving the equivalent of 34 cents an hour maximum wage.

Exhibits introduced showed that the average fare per passenger ranged from 2.8 cents in Chicago to 4.96 cents in some of the Eastern cities. The purpose of the graded scale was to insure just recognition of increased efficiency, to reward the men for long years of service, and to keep them in the service. In connection with the graded scale, Mr. Busby introduced an exhibit showing conditions in other cities.

The graded scale had been adopted for Chicago school teachers and was in line with the apprenticeship courses required in other skilled trades averaging approximately four years. According to Mr. Busby 200 days a year was the average working time for carpenters, with 185 days of the year as the average working period for all trades. The average earnings per annum for outdoor trades amounted to $785. The average wage in Chicago in all industries was approximately $590 a year, and the average wage of all industries in Illinois ranged from $588 to $914 a year. Most of this information was taken from the census of 1910.

Mr. Busby said that 6546 new applications were filed within the past year. In addition more than 5000 men had been refused permission to file applications. Only 871 positions were available during the year. Chicago conditions did not warrant an increase in wages at this time. Operating expenses were increasing faster than the gross income. Between 1902 and 1912, the capital required to develop and carry on the industry increased 113 per cent. Other exhibits showing the per cent of increase in passenger receipts over previous years, the decrease in the last annual report and the decrease since Feb. 1, 1915, were introduced. Another exhibit showed the receipts, expenditures and divisible receipts per revenue car-hour as increasing prior to 1914, and decreasing since that time. Numerous other statistical exhibits showing the expenses of maintaining property and making renewals were also introduced. In 1912 46,380 accidents were reported, or 46.7 per million passengers. In 1913 these figures were 39,330 accidents, or thirty-five per million passengers. In 1914 there were 37,143 accidents or thirty-three per million passengers. During the first four months of 1915, beginning Feb. 1, the number was reduced to twenty-eight accidents per million passengers. This included accidents of all kinds as reported by the trainmen. This closed the testimony taken on the evening of July 5.

On July 6 Mr. Busby was cross-examined regarding wages and transfers. Counsel for the employees questioned him about the surface railways contract with the city, the original purchase price of the properties and the allowances on construction costs when work was done by company forces. Mr. Busby thought that the Cleveland Railway and New York subway ordinances were more favorable to the companies than the 1907 Chicago ordinance. Mr. Busby received $60,000 a year salary; Henry A. Blair, chairman of the board of operation, $30,000 a year, and John M. Roach, adviser to the president, $20,000 a year. Each of the other four members of the board of operation received $2,500 a year. Counsel for the employees criticised the company for setting aside 14 per cent in cash for maintenance and renewals. Questions of depreciation, taxes and dividends paid by the surface railways were also touched upon.

William Weatherwax, general superintendent of transportation of the Chicago Surface Lines, followed Mr. Busby. In direct examination, he stated that men were promoted from the train service to responsible positions in nearly all the railway departments. He would rather not employ extrainmen because it was difficult for them to overcome their old habits. Mr. Weatherwax outlined his experience with the company beginning as a tow-boy in 1886. He compared old-time and present-day working conditions. Mr. Weatherwax thought that the five-year period was just right for a man to attain maximum efficiency. The request of the employees that all Sunday runs be eight hours or less was not practical. It would require the use of many men who would not have work on other days of the week. Mr. Weatherwax had not endeavored to increase the schedule speed, but found it difficult to keep the men from running in advance of the schedules.

MARKET STREET OPERATION, SAN FRANCISCO

Superior Court Judge Sturtevant granted a temporary injunction on July 6 to the United Railroads, San Francisco, Cal., restraining the city of San Francisco from operating municipal C and D line cars on the outer Market Street tracks below Geary Street. The court held that the city violated the contract with the United Railroads dated Nov. 12, 1912. No question of the usurpation of the franchise is involved, and municipal railways may still operate on Market Street the lines in operation prior to the 1912 agreement. This means that all passengers from the ferry to the exposition via Market Street must transfer. The court finds the municipal cars on the outer ferry loop so numerous that the United Railroads business is affected and excessive wear caused to the track and overhead construction. The judge states that his decision parallels the case of the Second Avenue Passenger Railway, Pittsburgh, involving the same principle. The United Railroads has been placed under a bond commensurate with the financial loss estimated by the Municipal Railway. Appeal to the Supreme Court is to be made immediately.

LATEST DETROIT PURCHASE DRAFT ACCEPTABLE

The Detroit (Mich.) United Railway, through President J. C. Hutchins, has notified the Detroit Street Railway Commission that the latest draft of the proposed agreement for the purchase by the city of the company's property within the one-fare zone is acceptable to the officials and will be presented to the stockholders on July 14 with a recommendation for acceptance. The letter to the commission also advised that upon acceptance by the commission of the contract the company would take steps immediately to procure the consent required of the trustees for the holders of the bonds to appear in the chancery court to fix the price of the property provided the contract is accepted by the electors. The commission accepted the contract and gave the company until Aug. 2 to obtain formal ratification by the stockholders and consent of the trustees of the bondholders to appear in the suit. In addition to the contract a number of city charter amendments must be prepared, and upon these agreement must be made by both parties.

In a letter to the commission, Mr. Hutchins repudiated the suggestion that the company's attorneys had endeavored to write anything into the contract "prejudicial to the city's interests," and stated that a similar allegation might be made against the city's attorneys. The company also wrote the commission to the effect that it would not accept the idea of having the grievances of the street car men's union threshed out before the commission, maintaining that the present method of arbitration is sufficient to take care of the matter. It is stated that Elihu Root will pass upon the agreement for the bondholders.

CINCINNATI TAX CASE

On the plea that the State is attempting to collect double taxes, the Cincinnati, Milford & Loveland Traction Company appealed to the Ohio Supreme Court on June 18 for an order directing the Hamilton County Court of Appeals to certify the record of the decision it recently rendered in favor of the State. This court decided that the company must list for taxation as its gross earnings all the sums collected by it, although under the terms of the agreement between it and the Cincinnati Traction Company it is compelled to turn over 3 cents out of every 5 cents from fares collected in the city to the Cincinnati Traction Company. As the Cincinnati Traction Company pays excise taxes on this portion of the receipts the interurban line holds that the construction of the law made by the lower court is incorrect.

The State Tax Commission has placed the value of the Cincinnati, Newport & Covington Light & Traction Company's property in Ohio at $1,020,620, an increase of $360,000 over 1914. This amount was fixed on the basis of the company's settlement with the Hamilton County authorities for the years prior to 1911, it is said. The question now arises as to whether the commission can add to the valuations for the years 1911-1914 inclusive. This has been submitted to the Attorney-General for a ruling. The increase grew out of a complaint recently made by Attorney R. S. Alcorn of Cincinnati.

QUESTION OF CONSENTS

Neither Cleveland nor Cincinnati may be able to push through certain contemplated extensions and improvements, requiring consents of owners of abutting property before October, if the Ohio Supreme Court does not convene in special session to render decisions on the cases that were argued on June 30 and July 1, since this tribunal has adjourned for the summer vacation. The cases were those of property owners on Euclid Avenue, Cleveland, between East Twentieth and East Fortieth Streets, and David L. Carpenter and other property owners on Reading Road, Cincinnati, who object to the extension of the Bond Hill line over their street.

Walter M. Schoenle, city solicitor, appeared for the city of Cincinnati and argued that the law requiring the consent of property owners to a street railway is unconstitutional and that a decision for the city would be of great advantage to all cities and towns of the State. Attorney Dinsmore, representing the property owners, asserted that the consent law is not a delegation of legislative power, as had been contended, but that it merely states conditions upon which the city may act.

The main question in the Cleveland case is whether the new charter adopted takes precedence over the State law, when there is a conflict between them. The charter provides that consents of property owners along the line of a proposed street railway track are not necessary. Law Director Stockwell represented the city and Attorney Harry J. Crawford represented the Cleveland Railway, while Attorney Wilbur Wilkin appeared for the property owners. Mr. Stockwell contended that the charter under the home-rule amendment to the constitution supersedes the State law.

Director Stockwell contends that if the Supreme Court rules against the city, it will have the right to build the track itself and lease it to the Cleveland Railway.

STATEMENT OF RAILROADS ON RAILWAY MAIL PAY

The committee on railway mail pay, representing 264 railroads, operating 218,000 miles of line, made public on July 3 a booklet entitled "What the Railway Mail Pay Problem Means to the Railroads." In the booklet the committee discusses the law dealing with the system of payment for mail transportation advocated by the Post-office Department introduced in the last session of Congress. This proposed law, known as the Moon bill, failed of passage, but the Postmaster General has announced that he intends to have it introduced again in the new Congress. In the opinion of the committee as set forth in the booklet, the defects of the present practice respecting the payment to the railroads for carrying the mails can best be remedied by providing the following reforms:

1. That the mails be weighed, and the pay be readjusted, at least once a year on every railway mail route, instead of once in four years, as at present.
2. That the railroads be paid for the use and operation of compartment post-office cars—for which the present law allows no pay—on a pro rata basis with the compensation allowed for full railway post-office cars.
3. That the railroads be paid for, or relieved from, the duty of carrying the mails between railroad stations and post-offices.

The booklet contains the resolutions unanimously adopted at the meeting of railroad executives in New York City on May 20, last, at which 90 per cent of the mileage of the country was represented. These resolutions completely sustained the position of the committee on railway mail pay, and indorsed the remedies it has suggested. The resolutions also approved the suggestion of the committee that in its opinion the ultimate solution of the railway mail pay problem would lie in reference of the matter to the Interstate Commerce Commission, with full power.

PHILADELPHIA TRANSIT LOAN APPROVED

The Councils of Philadelphia, Pa., on July 1 by unanimous vote passed ordinances appropriating the $6,000,000 transit loan to the Department of City Transit and authorizing Director of City Transit A. Merritt Taylor to let contracts and start work immediately on the Broad Street subway and the Frankford elevated. The ordinances allotted $3,000,000 of the loan for each of these projects. Actual construction work on both projects will be started on Sept. 13. Mr. Taylor says that if there is no delay in making the loans available, the entire Broad Street subway can be completed in thirty-two months and the Frankford elevated road within two years.

Advertisements appeared in the Philadelphia morning papers of July 2 inviting bids for the construction of the section of the Broad Street subway which will extend from a point in Broad Street at the north side of the existing subway structure of the Market Street Elevated Passenger Railway north of City Hall to a point in Broad Street at the south side of the existing subway structure of the Market Street Elevated Passenger Railway south of City Hall. This section will pass diagonally under the westerly side of City Hall. Bids for this work will be opened on Aug. 16. The specifications call for actual construction to be commenced on Sept. 13, and for the contract to be completed within thirty months.

Advertisements were scheduled to appear in the papers on July 8, inviting bids for the construction of the foundations for the Frankford elevated line, between Callowhill Street on the south and Unity Street on the north. Bids for this work will be opened on Aug. 16. The specifications call for actual construction to be commenced on Sept. 13, and for the contract to be completed within eight months. Advertisements will appear in the papers on July 26 inviting bids for the construction and erection of the steel work for the section of the Frankford elevated line, extending from Callowhill Street on the south to Unity Street on the north. Bids for this work will be opened on Aug. 23. The specifications call for the erection of the steel work to be commenced on Dec. 1, 1915, and for the contract to be completed within one year.

On July 1 Mr. Taylor issued a statement in regard to the work which he concluded as follows:

"Now that the policy of the city of Philadelphia has been finally determined by formal action on the part of the electors and the municipal authorities, after three years of research and public discussion, with full knowledge of all relevant facts, I hope that all parties in interest will cooperate generously in expediting the completion of the much-needed facilities which have been authorized, and such additions thereto as will be necessary, to the end that Philadelphia and Philadelphians may enjoy the bounteous returns which they will gain in time saving, convenience and comfort, and from a wider field of opportunity which will result from the establishment and operation of adequate rapid transit facilities in Philadelphia on a proper basis."

The Mayor has signed the transit loan bills.

WAGES IN SPRINGFIELD AND WORCESTER

The employees of the Worcester (Mass.) Consolidated Street Railway and the Springfield (Mass.) Street Railway have ratified the wage agreement with the New England Investment & Security Company referred to in the ELECTRIC RAILWAY JOURNAL of July 3, page 34. The new wage schedule provides for the same daily rate of wages now paid conductors and motormen on the Springfield Street Railway, but hereafter all overtime will be reckoned on the basis of nine hours a day instead of ten hours a day, as was settled upon when the previous agreement became operative. The employees of the Worcester Consolidated Street Railway, who received a minimum wage of 23 cents an hour and a maximum wage of 28½ cents an hour, will receive a minimum wage of 25 cents an hour and a maximum rate of 30½ cents an hour for the first six months and a minimum of 25 cents and a maximum of 31 cents for the last six months under the new agreement. The agreement will expire on May 31, 1916.

The miscellaneous departments, which include messengers, freight handlers, yard men and other employees, exclusive of conductors and motormen, will all receive increases in wages. The messengers hereafter will receive conductor's wages, which will mean that instead of working on an hourly basis at 25½ cents an hour for a ten-hour day, they will receive $2.85 for a nine-hour day, or an increase of about 6 cents an hour over the present rate. The platform men will receive an increase of 7½ cents an hour, with a reduction in hours. Instead of working a ten-hour day for $1.92½, they will receive $2 for a nine-hour day. All other departments classified under miscellaneous will get a nine-hour day, with an eight-hour day on Sundays and holidays. They will receive time and a half for all overtime work. It is estimated that 120 or more men of the miscellaneous departments will receive an increase in wages ranging from 5 to 37½ cents a day over and above what they receive now, not including the increase that is represented in the reduction of the working day from ten to nine hours.

Under the new management the wages of the employees of the Springfield Street Railway and the Worcester Consolidated Street Railway are practically equalized, the former still profiting by a small margin. The Worcester men receive a minimum of $2.25 a day for a nine-hour day as compared with $2.30, the present wages on the Springfield lines. They will receive a maximum of $2.75 for the first six months of the agreement and $2.79 for the last six months of the agreement, as compared with $2.85, the maximum daily rate on the Springfield lines. They will still continue to operate on platform time, whereas the Springfield conductors and motormen will continue to operate under a day schedule. The Springfield employees, instead of receiving a minimum of 23 cents and a maximum of 28½ cents for overtime, will receive about 25½ cents an hour for the minimum schedule and about 31½ cents for the maximum schedule. This means an increase of 2½ cents an hour for the one-year men and an increase of 3 cents an hour for the three-year men.

KANSAS CITY-CLAY COUNTY SUIT

Nine of twelve jurors in the Jackson County Circuit Court gave a verdict on July 1 for $1,500,000 damages to the Interstate Railway against the Kansas City, Clay County & St. Joseph Railway, the Wyandotte Construction Company, and the estate of George Townsend. The motion for a new trial will be heard on Aug. 2. If unsuccessful, appeal will follow. The Interstate Company, suing for $2,000,000, alleged that the defendants had usurped a right-of-way, which two-year options received several years ago had kept alive. Some property owners testified they had not given consent as claimed by the plaintiffs to notation of renewal on options. One question involved was whether the plaintiffs had paid for any land, or had done the work required by law to preserve the charter rights. A similar suit by the Interstate Company against the Missouri River & Camden Company, a Townsend steam road project, was thrown out of court four years ago. Suit similar to the Interstate case had been filed against the Kansas City, Clay County & St. Joseph Railway for $200,000 damages by the Kansas City & St. Joseph Electric Railway. This suit was dismissed, and the Kansas City-St. Joseph Electric Railway joined the Interstate Company, alleging it had sold its rights to the Interstate.

CINCINNATI TRANSIT COMMISSION REPORTS

The Rapid Transit Commission at Cincinnati, Ohio, made its report to Mayor Spiegel on July 2. It calls for the construction of a line under what is known as Modification H of Plan No. 4 and locates the line from a point in Norwood, a suburb of Cincinnati, through the Duck Creek ravine, under Owl's Nest Park, skirting the bluff and Mount Adams to a point near the Pennsylvania Railroad station; thence over Pearl Street to Walnut Street, as a subway under Walnut Street to the canal, in the canal to St. Bernard and then through the open country to Norwood. The cost of the line, exclusive of power house, equipment, and damages to adjoining property, is estimated by the commission at $5,717,849.

The commission says that the line should be built by the city according to the plan mentioned in its entirety and that the people should be asked to vote for a bond issue that will cover the cost. It is the opinion of the commission, however, that the line should be leased to an operating company. If no tenant is found in advance the city should operate the line in order to give the interurban lines an entrance to the business section.

The report contemplates a high-speed line over private right-of-way on the section between St. Bernard and Norwood as soon as the city is built up in that section and street crossings become dangerous. The commission recommends that land be purchased at once for that purpose. The opinion is expressed that the line would not earn its fixed expenses in the beginning and that the city should arrange to make this good in some way. The commission suggests that the proposed boulevard along the Miami and Erie canal be developed with the construction of the road. The subway should be open between street crossings, so that as much light and air as possible may be admitted to the cars.

The commission has been at work a year and has had the aid of George F. Swain, chairman of the Boston Rapid Transit Commission, Engineer F. B. Edwards, and Engineer Ward Baldwin, the latter having charge of the electrical phase of the proposition.

Mayor Spiegel has expressed disapproval of the plan, principally because it would provide excellent advantages to St. Bernard and Norwood, both of which have opposed annexation to the city. He says the western part of the city has been practically ignored by the commission. He also favors a wide street along the canal, instead of a boulevard. Mayor Spiegel said he would be in no hurry to act on the report, because such a large proposition should not be rushed through without due consideration. The report urged the appointment of a commission at once under the Bauer rapid transit act, so that the road may be built as soon as possible.

ARBITRATION OF WAGES IN RHODE ISLAND

The question of wages, about which the officers of the Rhode Island Company, Providence, R. I., and the representatives of the men have been unable to agree, will be arbitrated. A. E. Potter, president of the company, was quoted by the Providence *Journal* of July 2 in part as follows:

"We have agreed to arbitrate the wage question. We have reached a good understanding on all other matters, that is, the five demands made by the men. It is true that we offered the extra men $1.50 a day. In fact, we even went further, as we agreed to give that sum to all such men who were required to report for duty. This was done in lieu of any arbitration on this particular point. At yesterday's conference I offered to grant without further arbitration such increases as the men asked for in their recent demands, providing the company received an increase of 2 per cent in its business month by month compared with the previous year. Likewise I assured them that I would recommend to the board of directors that they be

given the increase asked for next year, providing we received an additional increase of 2 per cent in our business. I do not know what action has been taken on these proposals."

Electrification of Short Oregon Line.—It is reported that the purchase of the Rogue River Valley Railroad by the Southern Oregon Traction Company, Medford, Ore., means the electrification of the Rogue River line for its entire length, 8 miles, which includes 1 mile in Medford, 5 miles between Medford and Jacksonville, and 2 miles to the brickyard, and the extension on West Main Street of the present line of the Southern Oregon Traction Company.

First-Aid Chests Required on Illinois Railroads.—The Illinois Legislature, which adjourned last week, passed a bill requiring all railroads to provide emergency chests for first-aid to the injured on all trains. The workmen's compensation act was also amended so that its provision would apply to transportation companies, and a third bill amends the public utilities act to permit railroads to give transportation to newspapers and magazines in exchange for advertising

New Publicity Department for Barstow Properties.—W. S. Bartow & Company, New York, have started a new publicity department in charge of E. Burt Fenton, manager, an experienced newspaper man. For the present Mr. Fenton's headquarters will be in Sandusky, Ohio. The purpose of the new department is to distribute information of interest to the public concerning the various railway and lighting properties controlled by this company and bring the public into closer relations with these properties.

Mr. Moore Returns.—George Gordon Moore, well known through his activities in electric railway promotion in Michigan and his connections with the San Francisco-Oakland Terminal Railways, Oakland, Cal., has returned from Europe. When the war began Mr. Moore was invited by General Sir John French to visit France, and he was at the British army headquarters almost continuously from the outbreak of hostilities up to the time of his return to this country. It is said that Mr. Moore has the distinction of being the only American permitted to visit the English headquarters.

Question of Tunnel or Bridge in New York.—Chairman Edward E. McCall of the Public Service Commission for the First District, has sent a letter to the Board of Estimate and Apportionment, inclosing a report from Alfred Craven, chief engineer of the commission, upon the proposal made by the Board of Estimate that a tunnel under the East River at Sixtieth Street be substituted for the use of the Queensboro Bridge for the tracks of the new Broadway subway, to be operated by the New York Municipal Railway Corporation. The chief engineer prefers the use of the bridge in accordance with the dual system contracts rather than risk the delay which may follow a change in plans at this time. Commissioners J. Sergeant Cram and Robert C. Wood, however, favor the tunnel and have notified the Board of Estimate and Apportionment to that effect.

Pennsylvania Public Service Commission Appeals.—In declaring that it had no jurisdiction over appeals from the decisions of the Public Service Commission of Pennsylvania under the revised act of June 3, 1914, the Dauphin County Court has left nearly twoscore of such appeals from various business men's and improvement associations undecided with no apparent way of ever questioning these decisions in court. Under the act of 1913, the Dauphin County Court was named as the tribunal to hear all appeals from the Public Service Commission's decisions. When the act was superseded on June 3, the appeals were directed to the Superior Court with the proviso that they must be made within thirty days of the commission's decision. Some forty decisions had already been filed for argument in the Dauphin County Court, and when the first of these came up the court announced that it had no jurisdiction under the latest act. As more than thirty days have elapsed since the commission's decision, these appeals have no means of disposition. Several appeals have already been made to the Superior Court and at least one of these will question the constitutionality of the new legislative act.

Financial and Corporate

ANNUAL REPORT

Pittsburgh Railways

The statement of income, profit and loss of the Pittsburgh (Pa.) Railways for the year ended March 31, 1915, follows:

Gross earnings from street railway operations	$11,670,091
Operating expenses:	
Maintenance of way and structures	$1,183,427
Maintenance of equipment	733,076
Traffic	28,017
Transportation	4,384,329
General and miscellaneous	1,286,271
Total operating expenses	$7,615,120
Taxes	438,082
Total operating expenses and taxes	$8,053,202
Net earnings from street railway operations	$3,616,889
Auxiliary operations:	
Gross earnings	$143,532
Operating expenses and taxes	97,098
Net earnings	$46,434
Total net earnings	$3,663,323
Other income	112,833
Total income	$3,776,156
Deductions from income	2,955,797
Net income before deducting fixed charges	$820,359
Interest on funded debt	389,620
Interest on income debentures	330,739
Net income for the year	$100,000
Surplus, April 1, 1914	636,982
Additions to surplus	6,984
Gross surplus	$743,966
Deductions from surplus	116,692
Surplus March 31, 1915—per balance sheet	$627,274

Although the territory served experienced a very severe industrial depression covering almost the entire year, the loss in gross earnings from street railway operation was more than offset by economies practised and reduced cost of power. A comparison of the results of 1915 with those of 1914 show a decrease in the gross earnings from street railway operation of $112,769, or 0.95 per cent, the operating expenses having been decreased $280,747, or 3.55 per cent. The result was a gain in net earnings of $167,978, or 4.32 per cent. The operating ratio for street railway operation was 65.25 per cent in 1915 as compared with 67.01 per cent in 1914. The average passenger earnings per car-mile were 31.29 cents, as compared with 31.45 cents, a decrease in 1915 of 0.16 cent.

There was expended during 1914 the sum of $1,453,061 for improvements, betterments and extensions, of which $1,073,970 was charged to property accounts, and $379,091 to a deferred maintenance account, to be amortized during the life of the property benefitted. In addition, there was expended by the maintenance of way department $1,183,427 for ordinary maintenance of roadway, tracks, bridges and overhead construction. By improvements the fire-insurance cost for the year was reduced $7,955. During the year the toll bridges showed an increase in receipts of $4,875, or 20.19 per cent, and a decrease in expenses of $1,065, or 7.24 per cent.

During the year the company received the one hundred low-floor motor cars mentioned in a previous report. Nearly all of these are now in service. The low-floor, low-wheel, side-entrance car has met with the approval of the public, and it has been very satisfactory in operation. Owing to the public educational program adopted by the transportation and claim departments, the accidents and expenditures for claims have been greatly reduced. All the employees, with the exception of the trainmen, have been insured under the group-policy plan of the Equitable Life Assurance Society.

The above information is contained in the annual stockholder's report of the Philadelphia Company, which controls the Pittsburgh Railways. This report states that during the year the Philadelphia Company caused valuations to be made of its transportation and distribution lines, service lines, regulators, meters and compressing stations by independent

engineers. After making due allowance for depreciation these were incorporated in the balance sheet to the extent of a total increase of $12,556,441. The book values of the Philadelphia Oil Company, the Pittsburgh & West Virginia Gas Company and Equitable Gas Company shares were increased to represent more correctly the actual value. The company availed itself of the above increases to make a reduction of $8,924,254 in the valuation upon its books of street railway and traction stocks and other reductions in gas values sufficient to make the total amount of reduction in book values $15,774,052.

The report also contains the annual statement of the Beaver Valley Traction Company, showing in the main the following results: Gross earnings from railway operations, $334,093; operating expenses and taxes, $236,704; net earnings from railway operations, $97,388; net deficit from auxiliary operations, $4,262; total net earnings, $93,126; other income, $518; total income, $93,644; deductions and fixed charges, $96,132; deficit, $2,488, and surplus on March 31, 1915, $92,336.

NORTHERN ELECTRIC REORGANIZATION

Preliminary Details of New Arrangement—Plan Believed to be Satisfactory to All Parties

It is reported that the reorganization of the Northern Electric Railway, Chico, Cal., has been brought into concrete form. The new organization plan represents the perfected work of the attorneys representing the bankers' committee, the underlying bondholders' committee, the Spreckels interests and the Sloss trustees.

The general features of the plan are that a new railroad corporation will be created to acquire the properties of the Northern Electric Railway, the Sacramento & Woodland Railroad, the Marysville & Colusa Branch and the Sacramento Terminal Company, the latter subject to the $150,000 existing mortgage. This new corporation will issue first income bonds in exchange, bond for bond, for the bonds of the Northern Electric Company, the Sacramento & Woodland Railroad and the Marysville & Colusa Branch, and it will issue second income bonds in exchange, bond for bond, for the bonds of the Northern Electric Railway. All the bonds will bear interest at the rate of 5 per cent per year.

The unsecured creditors of the present companies will receive, as security for their claims, second income bonds equal to 50 per cent of their claims. These second income bonds will be delivered to the unsecured creditors by the Sloss Securities Company, and will be the consideration which the latter company will receive for its participation in the plan and for its cancellation of various unsecured claims it now holds against the Northern Electric Railway amounting to more than $1,000,000.

The new corporation will also create a first mortgage bond issue of $500,000 for the purpose of raising sufficient money to pay for necessary repairs and replacements to the road, receivers' certificates, expenses, attorneys' fees, costs of litigation, preferred claims for labor or materials which have been ordered paid by the court, and expenses of reorganization.

Interest will be payable unconditionally on the first mortgage bonds from the date of issue, and after five years from date upon the first income bonds. During the first five years interest will be payable on the first income bonds only as and when earned by the new corporation. Upon the second income bonds the annual interest charges will be non-cumulative.

All of the stock of the new corporation will be placed in trust with the Union Trust Company of San Francisco for a period of five years, with the power of selling the same for not less than $2,000,000. In case of such sale the money will be distributed pro rata among the unsecured creditors and those secured by second income bonds. While the stock is so held in trust, the trust company will vote a majority of the stock in accordance with the instructions of the first income bondholders.

It is expected that the complete reorganization plan will soon be submitted to the bondholders and the creditors for their final approval. Support for the arrangement from all sources is anticipated.

REASON FOR PUGET SOUND DIVIDEND CUT

A circular has been addressed by the directors of the Puget Sound Traction, Light & Power Company, Seattle, Wash., to the stockholders in regard to the reduction of the quarterly dividend on the preferred stock of the company to three-quarters of 1 per cent, as noted briefly in the ELECTRIC RAILWAY JOURNAL of July 3, page 38. The directors say:

"This reduction of dividend is due to a decrease in earnings caused by operation of jitney buses at a time when business conditions have been generally unsatisfactory. The jitney first appeared in the Puget Sound district in January of this year, rapidly increasing in number until in February and March there were about 700 in operation, resulting for a time in a loss in gross earnings to the company of more than $2,000 a day. A careful study of jitney operation throughout the country gives every indication that such cars under fair and reasonable regulation cannot be operated permanently and profitably in competition with street railways. A gradual decrease in such competition is, therefore, to be expected and such decrease is already taking place in the Puget Sound cities, the number of cars now in operation being less than 400.

"It is the opinion of the directors that neither the business depression alone, nor the operation of the jitney alone, would have affected earnings to such an extent as to make the reduction of dividend advisable. The company is at present in a strong position financially, with a substantial cash balance and only a small floating debt. The directors believe that this position should be maintained. As the company has had but six months of jitney competition, and as under most favorable circumstances this competition will not immediately disappear, they feel the company's resources should be conserved through postponing the payment of a portion of the preferred stock dividend.

"A return of general business toward normal conditions, or a further reduction in the operation of jitneys, should warrant the resumption of preferred stock dividends at the regular rate. The preferred stock is cumulative and, therefore, any deferred payments must be made up before dividends are paid on the common stock."

DES MOINES RECEIVERSHIP

Emil G. Schmidt, president of the Des Moines (Iowa) City Railway, has been appointed receiver of the property by the Federal Court as a result of action by the bondholders of the company to protect their interests. The decision of the State Supreme Court that the company's right to operate in Des Moines ends on Aug. 22 is believed to have been nullified by this latest court proceeding. Franchise negotiations are continuing, however, and a franchise settlement is expected. The franchise rights of the company were already being contested for by the bondholders in the federal courts, and the receivership will enable the company to make much-needed improvements which could not be made before on account of the unsettled franchise situation. Mr. Schmidt says that the jitney traffic in Des Moines is showing a big decrease and is now on the point of vanishing, if the growing receipts of the city railway are a criterion. The validity of the new jitney ordinance, which has been attacked in the courts, is undecided. Previous reference to the default in bond interest and the franchise difficulty of this company was made in the ELECTRIC RAILWAY JOURNAL of April 17.

Augusta-Aiken Railway & Electric Corporation, Augusta, Ga.—The officers of the Augusta-Aiken Railway & Electric Corporation recently filed with the Secretary of State of South Carolina a certificate of increase in capital stock from $1,500,000 to $2,500,000.

Bay State Street Railway, Boston, Mass.—The directors of the Bay State Street Railway have decided not to pay any dividend at this time on the $20,517,200 of common stock, practically all of which is owned by the Massachusetts Electric Companies.

Belvidere (Ill.) City Railway.—W. C. Foster, Rockford, Ill., representing interests of that city, has purchased at auction the Belvidere City Railway.

Camaguey (Cuba) Company, Ltd.—The stockholders of the Camaguey Company, Ltd., have approved a proposition

to give the Electric Bond & Share Company an option for ninety days on the $1,000,000 of capital stock of the company at $90 a share. Examinations of the properties will be made.

Cleveland (Ohio) Railway.—The State Tax Commission has fixed a tentative valuation of $24,891,100 on the property of the Cleveland Railway. Although the company has refused to pay the amount of taxes demanded for the last two years because of the excessive valuation placed on its property, and has brought suit to enjoin the collection of the amounts claimed each year, the tentative figures show an increase of $2,138,370 over the value fixed last year and about $5,000,000 more than the company is willing to concede. Each year the company tendered a check for the amount of taxes it was willing to pay and each year this was rejected by the county treasurer. These amounts have been set aside for payment when the courts adjudicate the matter. The company has insisted that the commission make known its methods of fixing the valuation, but this request has been refused.

Grand Valley Railway, Brantford, Ont.—The offer by the city of Brantford of the sale of the Grand Valley Railway line from Paris to Galt for $30,000 and electrification of the Lake Erie & Northern Railway from Port Dover to Brantford, has not been accepted by M. H. Todd, acting for the Canadian Pacific Railway.

Lake Shore Electric Railway, Cleveland, Ohio.—The directors of the Lake Shore Electric Railway have decided to use the surplus earnings in the development of the business instead of making further dividend disbursements at present. The power service of the company is being improved at considerable cost, but the changes are expected to reduce the cost of production materially and make it possible for the company to increase the business of this department. The first preferred stock of the company is a cumulative issue.

Norton & Taunton Street Railway Company, Norton, Mass.—Judge De Courcy in the Supreme Court has appointed Amos F. Hill, Lowell, as receiver of the Norton & Taunton Street Railway Company, until foreclosure proceedings are brought by the American Trust Company, trustee for the bondholders, on account of defaulted interest. The company is a consolidation of the Mansfield & Norton, Mansfield & Easton, Norton & Attleboro and Norton & Taunton street railways. On June 1, 1903, all were mortgaged to the American Trust Company to secure $296,000 of 5 per cent bonds.

Pacific Gas & Electric Company, San Francisco, Cal.—The board of directors of the Pacific Gas & Electric Company has declared a stock dividend of 6 per cent on the outstanding common stock, payable with stock certificates for whole shares of new common stock and stock dividend warrants for fractional parts of such shares in two instalments, 3 per cent on July 15, 1915, and 3 per cent on Dec. 15, 1915, to holders of common stock of record on June 30, 1915. Previous reference to this declaration was made in the ELECTRIC RAILWAY JOURNAL of June 19.

Peoria (Ill.) Railway.—The Illinois Public Utilities Commission has issued an order permitting the Peoria Railway to sell $115,000 of first and refunding 5 per cent mortgage bonds.

Southern Oregon Traction Company, Medford, Ohio.—The purchase of the Rogue River Valley Railroad, an 8-mile steam line, by the Southern Oregon Traction Company is reported.

Washington & Maryland Railway, Washington, D. C.—The Public Utilities Commission of the District of Columbia has authorized the Washington & Maryland Railway to issue $66,200 of first mortgage thirty-year 5 per cent bonds at the highest price obtainable under such details of sale as may be approved by the commission. The proceeds are to be used to fund indebtedness for cost of construction and improvements now made and to provide working capital. In a previous decision the commission valued the property of the company, including working capital, at $63,381 as of Aug. 15, 1914. The present debt to be funded is $53,000, and in order that the total securities may not exceed the fair value, the outstanding capital stock must be reduced to $10,360.

Western Ohio Railway, Lima, Ohio.—The Western Ohio Railroad was authorized by the Public Utilities Commission of Ohio to transfer its interurban property to the Western Ohio Railway and its electric light property at Sidney to the Standard Power & Equipment Company.

DIVIDENDS DECLARED

Bay State Street Railway, Boston, Mass., 3 per cent, first preferred.

Boston (Mass.) Suburban Electric Companies, 50 cents, preferred.

Brooklyn (N. Y.) City Railroad, quarterly, 2 per cent.

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii, quarterly, 2 per cent.

International Traction Company, Buffalo, N. Y., 2 per cent preferred.

Kentucky Securities Corporation, Lexington, Ky., quarterly, 1½ per cent, preferred.

Ottawa (Ont.) Traction Company, Ltd., quarterly, 1 per cent.

Ottumwa Railway & Light Company, Ottumwa, Iowa, quarterly, 1¾ per cent, preferred.

Public Service Investment Company, Boston, Mass., quarterly, $1.50, preferred.

Puget Sound Traction, Light & Power Company, Seattle Wash., quarterly, 75 cents, preferred.

Railway & Light Securities Company, Boston, Mass., 3 per cent, preferred; 3 per cent, common.

South Carolina Light, Power & Railways Company, Spartanburg, S. C., quarterly, 1½ per cent, preferred.

Springfield & Xenia Railway, Springfield, Ohio, quarterly, 1½ per cent, preferred.

Youngstown & Ohio River Railroad, Leetonia, Ohio, quarterly, 1 per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL.

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., May, '15	$165,033	$114,124	$50,909	$39,678	$11,231
1 " " '14	186,749	125,732	61,017	39,604	21,413
11 " " '15	1,818,854	1,175,487	643,367	438,487	204,880
11 " " '14	1,920,524	1,219,435	701,089	420,259	280,630

BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, ME.

1m., May, '15	$60,920	*$32,008	$28,912	$17,500	$11,412
1 " " '14	56,965	*27,962	29,003	17,367	11,636
12 " " '15	791,131	*382,303	408,828	209,925	198,903
12 " " '14	772,137	*352,698	419,439	208,423	211,016

CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.

1m., May, '15	$90,909	*$59,018	$31,891	$30,079	$1,812
1 " " '14	94,761	*59,111	35,650	28,840	6,810
12 " " '15	1,045,731	*704,925	340,806	347,431	†6,625
12 " " '14	1,172,194	*709,159	463,035	315,806	147,229

COLUMBUS RAILWAY, POWER & LIGHT COMPANY, COLUMBUS, OHIO

1m., May, '15	$245,947	*$151,170	$94,777	$37,821	$56,956
1 " " '14	254,559	*166,580	87,979	43,673	44,306
12 " " '15	3,065,554	*1,846,344	1,219,210	467,975	751,235
12 " " '14	3,052,154	*1,965,552	1,086,602	489,108	597,494

COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY, GRAND RAPIDS, MICH.

1m., May, '15	$1,108,008	*$585,862	$522,146	$359,853	$162,293
1 " " '14	1,106,985	*586,519	520,466	343,608	176,864
12 " " '15	14,017,929	*7,520,595	6,497,334	4,294,048	2,203,286
12 " " '14	13,894,073	*7,697,943	6,196,130	3,988,669	2,207,461

CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, ME.

1m., May, '15	$204,546	*$117,802	$86,744	$70,326	$16,418
1 " " '14	197,885	*114,135	83,750	63,504	20,246
12 " " '15	2,550,473	*1,441,152	1,109,321	769,781	339,540
12 " " '14	2,429,876	*1,398,351	1,031,525	747,687	283,838

EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.

1m., May, '15	$194,301	*$117,593	$76,708	$63,889	$12,819
1 " " '14	227,430	*153,711	73,719	59,686	19,033
12 " " '15	2,498,810	*1,483,543	1,015,267	747,005	268,262
12 " " '14	2,751,609	*1,731,975	1,019,634	611,725	407,909

NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO

1m., May, '15	$323,324	$191,317	$132,007	$51,524	$80,483
1 " " '14	323,036	191,808	131,228	50,660	80,568
5 " " '15	1,424,675	900,768	523,907	255,962	267,945
5 " " '14	1,403,920	860,110	543,810	250,815	292,995

REPUBLIC RAILWAY & LIGHT COMPANY, NEW YORK, N. Y.

1m., May, '15	$247,644	*$148,625	$99,019	$56,845	‡$42,239
1 " " '14	256,325	*159,538	96,787	56,454	‡40,407
5 " " '15	1,210,228	*755,134	455,094	284,286	‡171,132
5 " " '14	1,247,905	*777,784	470,121	279,187	‡191,284

*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

THE JITNEY BUS

Philadelphia Regulatory Measure Signed—New Orleans Ordinance Sustained in State Supreme Court

On July 2 Mayor Blankenburg of Philadelphia signed the Jitney regulation ordinance after it was returned to him by Councils with his amendment to the zone clause refused. The ordinance will become effective on July 12. In a statement the Mayor made it plain that he objected to the zone clause in the measure, but that he was opposed to permitting jitneys to operate unregulated all summer. Immediately after announcement was made that the Mayor had signed the bill, G. S. Winner, president of the Jitney Auto Service Company, said his organization would ask the Court of Common Pleas to grant a temporary injunction restraining the department of public safety from enforcing the provisions of the law. If this request is refused, he said, the company would appeal to the Public Service Commission for redress. John H. Fow, counsel for the Jitney Auto Association, also said he would file a bill in equity restraining the police department from enforcing the zone section of the ordinance.

The New Orleans ordinance designed to regulate jitney traffic was upheld on June 28 by the State Supreme Court, and a temporary injunction obtained in the Civil District Court by jitney owners to prevent the city authorities from enforcing the law was dismissed. Owners of jitneys objected principally to a provision of the ordinance which stipulated that all owners must give an indemnity bond of $5,000. Each of the cars of the New Orleans Railway & Light Company is affected by the ordinance.

When the proposed ordinance regulating the jitneys in Scranton, Pa., came before Councils, a delegation of jitney owners asked Councils to define regular routes for them to travel on streets not occupied by the lines of the Scranton Railways, and offered to furnish the city with a blanket bond covering all members of the association. The offer was accepted.

At the request of the Pottsville (Pa.) Jitney Owners' Association, Judge Brumm has issued an injunction on Mayor Mortimer and the City Council preventing the enforcement of the jitney ordinance recently passed. The jitney owners say the new law is impossible of enforcement, as it requires a certificate of efficiency from all drivers, and there is nobody with authority to issue such certificates. They also charge that taxicabs exact large fares and are taxed only $10 annually, while jitneys with 5-cent fares are taxed from $25 to $100.

City Solicitor Field of Baltimore, Md., has submitted to the Board of Estimate a tentative ordinance for the regulation of the jitney in that city. The measure fixes the license fee at $200 for a car with a capacity of eight passengers or less, with an additional payment of $25 for every passenger in excess of eight. A further tax of 9 per cent of the gross receipts is provided, this being at the same rate as the tax imposed on the earnings of the local railways for park purposes. The matter of an indemnity bond has not been covered in the measure as prepared by Mr. Field, as the Mayor believes that this could perhaps be dealt with better in a separate measure.

The jitney regulatory ordinance passed by the City Council of Grand Rapids on May 10 has gone into effect. The Council found that of the 3385 names signed to a petition presented by the jitney men for a referendum only 947 were qualified electors and the petition was promptly revoked. The ordinance provides for the payment of a license fee of $3.50 for each passenger according to seating capacity. The bond for each driver is fixed at $10,000. Jitneys are required to operate between 6 and 10 a. m., noon, 1 and 2 p. m., and 5 and 8 p. m.

Judge Leslie R. Hewitt of the Superior Court at Los Angeles, Cal., has sustained the city's demurrer to the suit of J. M. McClasky for an injunction to restrain enforcement of the motor bus ordinance. The ordinance became effective July 1, but the provision for $11,000 indemnity bonds does not become effective until July 17.

JITNEY DECREASE IN OAKLAND

Careful counts made by the San Francisco-Oakland Terminal Railways of the jitney buses operating in Oakland, Cal., indicate a gradual decrease in the number of 5-cent auto vehicles. The craze began the latter part of December, 1914, and within thirty days approximately 500 machines appeared in the service. The need of legislation was quickly demonstrated. At that time jitney drivers were operating under a resolution passed by the City Council, permitting them to operate on a $5 per annum license fee. The first formal ordinance, passed in February, 1915, added an indemnity bond of $10,000 for each machine. Under this clause the jitneys have been paying a premium of $80 to $100 per annum to the Pacific Coast Casualty and the Guardian Casualty & Guarantee Companies. The latter company, however, has recently withdrawn from the field, gradually cancelling all bonds already written and refusing to write any new business. This ordinance also raised the city license fee from $5 to $60 per annum, payable quarterly; specified regular routes; called for a full stop at all railway crossings and other minor regulations under direct supervision of the chief of police of the city.

The ordinance was objectionable to the jitney operators, particularly the clauses in reference to the $60 annual license fee and full stop required at all railway crossings. The City Council reconsidered the matter and passed a new ordinance which, while requiring the annual license fee of $60, provided full stops at railroad crossings not controlled by flagmen or traffic officers and permitted operation over street railway crossings at a reduced speed of 5 m.p.h. This second ordinance was also opposed by the jitney operators on the ground that the $60 license fee was exorbitant. An amendment was proposed to reduce this amount to $10 per annum. This proposal was referred to a referendum vote by the people at the regular mayoralty election on May 11, and was defeated. The election at the same time approved an amendment making it obligatory upon the chief of police to revoke jitney licenses for violation of any part of the ordinance or any traffic law passed by the city.

The principal point now in dispute is between the city and those jitney operators who are operating under the original $5 annual license fee. The city is endeavoring to collect the license fee under the new ordinance while the jitneys contend they are not liable to the $60 tax until their original license expires. The city attorney has advised the Council that the right to increase the license fee is a legal one and the jitney operators received grace until July 1 to come in under the new license.

At present about seventy-five jitney operators are running under the original $5 license fee which nominally expires on Jan. 1, 1916. They are preparing to contest the ruling of the city attorney through a case now pending in the lower courts, but with little encouragement for relief.

During the latter part of April 284 machines were licensed for jitney operation, but from actual count only 246 operated regularly during the week, except that on Saturdays due to increased travel and half-holidays, nearly all were operated. At that time the average earning per car was about $4.25 per day, the longest route was 4.4 miles and the shortest 2.1 miles. In the latter half of May the total of machines licensed to operate had decreased to 270, but only 196 were in actual operation on week days other than Saturday. The greatest reduction was noticeable on the longest routes. By the middle of June the total number of licenses had decreased to about 200, which is accounted for by the rapid deterioration of machines, accidents, extraordinary wear, decrease in earnings and the apparent wearing off of the novelty as well as the usual loss of travel during the summer months on account of the absence of vacationists from the city.

Inquiry among jitney bus drivers indicated that no operators have made more than a living wage; also that a great many who are now running contemplate leaving the jitney field as soon as they are able to procure employment elsewhere. It was considered likely that many machines would be withdrawn from service under the provision for the renewal of licenses which was to go into effect on July 1.

THE PUGET SOUND COMPANY'S JITNEY SERVICE

A. L. Kempster, manager of the Puget Sound Traction, Light & Power Company, operating in Seattle, Everett, Bellingham, and Tacoma, states that preparations for installing jitney bus service in Seattle, heretofore reported in the ELECTRIC RAILWAY JOURNAL, are well under way, and that the first unit of fifty machines will be in operation in the very near future. Mr. Kempster said:

"Some of the machines are being operated temporarily in Everett, but they will be put on in Seattle as soon as we are in shape to handle the traffic. The first fleet will consist of fifty machines. We may confine the jitney system to that number or we may put on 200 more, just as there seems to be profit in a speedy short-haul business. No selection of routes has been made as yet, but it is probable that the Broadway and the Woodland Park runs will receive our attention first, as these seem to be profitable and much desired by the independent jitney operators. We are training our own men for the operation of our jitneys, and shall not accept anyone from the ranks of the licensed jitney bus operators. In this manner, we will find an outlet for certain labor not productive of profit now, and in addition we will be utilizing men whose records are well known to us and who have the fullest measure of our confidence. This will reduce the possibility of reckless driving, inefficient handling of traffic, or discourtesy."

The company contends that with a central repair plant, the ability to purchase supplies in large quantities, and other advantages that accrue through its well-developed organization it will make a better profit than is possible for the independent operators. According to the plans of the company, there will be no specially constructed bodies on small-car chasses, the company taking the stand that as soon as the attempt is made to carry a large number of persons in a jitney the element of speed, which is apparently one of the main desires of the traveling public, is lost.

SAN DIEGO TRAFFIC DECREASE

Division of Traffic Losses in San Diego Ascribes 62 Per Cent to the Jitney

Although it is the seat of the Panama-California Exposition, San Diego has suffered a slump in travel of all kinds due to the business depression. So far as the San Diego Electric Railway is concerned, the losses are enlarged by the still-unregulated jitney business. The company has made analyses of the jitney travel from time to time, and from these it has drawn the conclusion that about 62 per cent of the losses are due to this cause. The comparative figures for Sept. 1 to April 30, 1914 and 1915 respectively show a decrease in gross earnings from $638,399 to $625,847, or $12,551, equivalent to 2 per cent. During the period of Sept. 1, 1914, to April 30, 1915, the jitneys carried about $84,000 of business, while the hard times were held responsible for a loss of $50,153. The latter two figures are based on comparisons of actual business and what the company expected with the normal annual increase in business up to May 1, the influence of the Panama-California Exposition has not become a determining factor in the company's revenues.

A count of jitney business at San Diego on May 29 for the eighteen hours from 6 a. m. to 12 midnight showed 2954 round trips, 7046 passengers, and $352.30 in receipts. The average passengers carried per trip were 2.39. The total number of cars was 125, giving an average of $2.82 per car. An ordinance regulating jitney traffic was passed by the Common Council on May 1, but its enforcement was postponed pending the service of a restraining order which expired on June 7. Since Jan. 1 the number of jitneys has averaged about 125. At one time as many as 200 men were engaged in jitney operation.

The company has lately adopted the plan of carrying its case to the public through a series of advertisements in the newspapers. All of the advertisements occupy large space and are directly concerned with problems growing out of the jitney competition. The subjects dealt with are indicated by the headings on the advertisements. Some of the headings in recent statements to the public follow: "Reduce Fares and You Break the Street Car Company," "Why We Reduced Our Car Service," "Would the People Stand for the Jitney Bus if They Owned the Street Railway Lines?" "A Crippled Street Car System Is the Surest Way to Cripple a City," "Is the Jitney Competition Fair?" "Jitney Buses Make Hundreds of Men Jobless."

THE RECKLESS CHAUFFEUR

Vigorous Campaign of the Long Island Railroad to Inculcate Respect for Safety

The Long Island Railroad has inaugurated a campaign to induce chauffeurs and automobile drivers to be more careful when driving over grade crossings on Long Island. At prominent points on Long Island, where they cannot fail to be seen by those in automobiles, the railroad is placing huge signs which read:

THIS SIGN MAY SAVE YOUR LIFE TO-DAY
All the Precautions in the World Will Not Save the Lives of Those Who Drive Automobiles Recklessly Over Railroad Crossings
When Approaching a Crossing Please Stop, Look and Listen
We Are Doing Our Part. Won't You Do Yours?
LONG ISLAND RAILROAD.

The first of these signs has been placed at Broadway, Flushing, on the electrified division, where the railroad bridge crosses the highway. Some of the signs will be 50 ft. long and 10 ft. high, while others will be 10 ft. square. Several of them will be electrically lighted at night.

Not only is the Long Island Railroad putting up signs calling the attention of motorists to the danger of driving recklessly over grade crossings, but it is going to conduct an advertising campaign with a series of "life saving bulletins." These bulletins will make a plea for greater care on the part of drivers of motor cars on Long Island. There are still 631 grade crossings on Long Island. Up to date, 305 have been eliminated at a cost of more than $15,000,000. At the present time, work on the elimination of thirty-two more crossings is in progress.

J. A. McCrea, general manager of the company, is urging upon the State of New York action similar to that taken by New Hampshire, which has just passed a law requiring every city and town to maintain a warning sign on every highway approaching a crossing at a reasonable distance on each side of the crossing. Under the New Hampshire act grade crossing protection is put in the hands of the Public Service Commission. That commission has ordered that enamel metal signs 24 in. x 12 in., white letters on a blue ground, shall be placed at varying distances from grade crossings. If any town for sixty days neglects to comply with the commission's order, it forfeits $1 for each day. Anyone injuring or defacing these signs is liable to a fine of $10.

Since 1911 there have been some 507 accidents at grade crossings on Long Island as the result of recklessness on the part of automobilists, motorcyclists, carriage and wagon drivers. In that period forty persons were killed and 111 persons injured, for none of which casualties the railroad company was responsible. Of the people killed twenty-four were in automobiles, twelve in wagons and carriages, and four on bicycles and motorcycles. Of the people injured sixty-seven were in automobiles, twenty-six in wagons and carriages, and eighteen included pedestrians, bicyclists and motorcyclists. In forty-two of the 507 grade-crossing accidents nobody was injured. In 157 cases automobile and wagon drivers defiantly ran their machines and vehicles through lowered gates, damaging the railroad's property to the extent of breaking the crossing gates. In attempting to cross the tracks 125 autos and fifty-three wagons were damaged. Some were struck by trains while others sustained damage by contact with lowered gates. From 1911 to June 17, 1915, a total of sixteen horses were killed and eight injured at Long Island grade crossings through the carelessness of their drivers.

J. A. McCrea, general manager of the Long Island Railroad, said on June 20:

"The Long Island Railroad management regards every accident as one too many, and it is now in the midst of an aggressive campaign to the end that life and property shall be preserved. If those who have occasion to use grade crossings on Long Island will co-operate with us, we shall succeed in accomplishing this distinctly humane object. Without their aid we must fail."

MILWAUKEE FARES

Pending the determination of the reasonableness of the original order by the Railroad Commission of Wisconsin commanding thirteen tickets to be sold for 50 cents by The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., the fare coupons given out by the company pending the Supreme Court Appeal will not be accepted for passage, according to J. D. Mortimer, president of the company. In a statement which he made Mr. Mortimer is quoted as follows:

"This company's investment in railway business is now earning so little as to make the expenditure of additional capital for further facilities absolutely impossible without obtaining some relief. Relief should take two forms—increased revenues and the cessation of hostile attacks on the business of the company. Both are necessary and the latter is as important as the former.

"When The Milwaukee Electric Railway & Light Company appealed from the decision of the Railroad Commission of Wisconsin, ordering the company to sell thirteen tickets for 50 cents, it was agreed by stipulation that the company should have the opportunity of contesting the reasonableness of the order, should the courts finally hold that the commission had the power to modify rates of fare prescribed by the company's franchise.

"The courts have now held that the commission possesses this power. Pending the determination of the reasonableness of the 'thirteen tickets for 50 cents' order, the fare coupons cannot be accepted in payment for transportation.

"Subsequent to the entry of the commission's order referred to, many things have occurred. The expense of the company of maintaining paving within the track zone has developed into large proportions. Requirements for increased service, resulting from special orders of the commission, have largely increased operating expenses. Opening of new lines and extensions of track, yet unproductive of appreciable earnings, have further reduced the margin which the commission believed to exist in the year 1912. General advances in prices paid for materials and labor have also increased expenses. More recently the advent of the jitney bus has reduced receipts without reducing expenses."

The decision of the United States Supreme Court in the Milwaukee fare case is abstracted elsewhere in this issue.

SAFETY FIRST IN BROOKLYN

The safety organization of the surface transportation department of the Brooklyn (N. Y.) Rapid Transit Company has presented its first half-yearly report, for the six months ended June 7. The report is signed by A. Maxwell, superintendent of employment, who is secretary of the departmental safety committee of the surface transportation department. In summarizing the results of the safety work to date Mr. Maxwell says:

"As to what bearing the net result of the safety movement to date has had on the accident situation is an interesting question. The monthly claim department accident statement for Classes A, C, D, and E accidents for the six months under review shows as follows in per cent, when compared with the corresponding period of the previous year:

Classification	Dec., 1914	Jan., 1915	Feb., 1915	Mar., 1915	Apr., 1915	May, 1915
Car collisions	—57.2	—32.1	—70.0	—35.5	—16.7	—53.1
Car and vehicle collisions	—32.9	—18.9	—42.6	—52.2	—21.2	—28.1
Cars striking persons	—43.1	—12.5	+43 1	+11.7	— 4.9	—35.7
Boarding and alighting	—25.9	— 2.4	—17.3	— 0.7	Even	—21.7

"The prime reason for tabulating only the above four classes of accidents here is that these classifications more directly concern platform employees than any other class of accident, and, if statistics count for anything, these figures should reflect just what the men themselves are accomplishing toward minimizing and reducing our accident hazard.

"In conclusion it is believed that the safety movement of the surface transportation department has been fairly and successfully launched, and that, as time advances, what may now be described as an imperfect system will become a complete, harmonious and perfect system to the ultimate benefit and gain of the company and the community at large."

Curbing the Philadelphia Chauffeur.—The trainmen in the employ of the Philadelphia (Pa.) Rapid Transit Company have been asked to co-operate with the police of that city toward reducing reckless auto driving by reporting infractions of the traffic rules by chauffeurs.

One-Man Car Request Refused.—The Public Service Commission of Massachusetts has refused the request of the Milford, Attleboro & Woonsocket Street Railway for authority to operate electric cars in charge of one man on its lines between Cellingham, Four Corners and Caryville.

St. Louis Skip-Stop Hearing Concluded.—The hearing before the Public Service Commission of Missouri upon the request of the United Railways, St. Louis, for permission to eliminate 770 car stops was concluded on June 26. Attorneys were instructed to file their briefs within ten days.

Passes Withdrawn.—A bulletin has been issued by the East St. Louis & Suburban Railway, East St. Louis, Ill., in regard to free transportation. Mail carriers will hereafter be carried gratis only between 6 a. m. and 8 p. m. Deputy sheriff badges will not be honored, nor will the special agents of railroads receive free rides. Terminal Association agents will be carried free only on Eads Bridge. Policemen and firemen will be carried free only when they are dressed in full uniform.

Invites Manufacturers.—The Indiana & Michigan Electric Company, South Bend, Ind., is advertising in the Chicago daily papers, the manufacturing advantages of the St. Joseph Valley and the many attractions of South Beach, Elkhart, Mishawaka, Niles, Buchanan and other communities to manufacturers seeking smaller cities for location. Manufacturers are invited to submit their industrial problems to the Indiana & Michigan Company and the traction company promises co-operation.

New Detroit Interurban Station.—On July 1 the Detroit (Mich.) United Railway opened a new interurban station in Detroit. The ground floor is given over almost entirely to the uses of patrons of the interurban lines, while the remaining five stories of the building will be used for the general offices of the company. One of the features of the building is a wide gallery which has been fitted up as a ladies' rest room. The new office building and station is at Bates Street and Jefferson Avenue and was formerly the Edson-Moore Building.

Lexington Participation Plan.—All of the non-union trainmen of the Kentucky Traction & Terminal Company, Lexington, Ky., have accepted the contract proposed by the company some time ago, on the basis of an increase in wages proportioned on the saving made through any reduction in the cost of accidents. The union men have declined to accept the contract. They are reported to have drawn up a substitute contract which they will present to the company to replace the old one, which expires this month. The contract with the non-union men went into effect on July 1 for a term of three years. The general conditions of the participation plan were referred to in the ELECTRIC RAILWAY JOURNAL of June 19, page 1183.

The Memphis "Jim Crow" Case.—The Memphis (Tenn.) Street Railway has won its case in the courts in which its interpretation of the "Jim Crow" law was involved, the State Supreme Court having upheld the measure thus reversing the Circuit Court and the Court of Appeals. The case centered on the question of seats, two white men having entered a street car when there were plenty in the white compartment and having taken seats reserved for negroes. When the car filled up the conductor called upon them to give up their seats to negroes. They agreed to if he would get them seats in the white section. The upshot of the incident was that the conductor ejected the men and had them put under arrest, whereupon they brought suit for damages, getting an award of $1,000 each in the lower court. The Supreme Court said in part: "These seats must be kept separate and apart; there should be a well-defined dividing line; blacks should be made to occupy their own seats and the whites theirs. Conductors have a sort of police power over passengers, and the latter are subject to orders from this officer, who must live up to the statutory provisions." The case was that of A. M. Keisker, and Ralph Bowden against the Memphis Street Railway.

Personal Mention

Prof. Charles M. Spofford, of the firm of Fay, Spofford & Thorndike, consulting engineers, Boston, and head of the department of civil and sanitary engineering of the Massachusetts Institute of Technology, has been appointed by the Governor of Massachusetts a member of the Terminal Commission, constituted by a recent legislative act to investigate the subject of terminal facilities and the improvement of facilities for the transportation of freight in the Boston metropolitan district.

Mr. Frank C. Rose has been appointed purchasing agent for W. S. Barstow & Company, Inc., New York, N. Y., engineers and manager for the General Gas & Electric Company and the Eastern Power & Light Corporation, which control among other properties the Rutland Railway, Light & Power Company, Rutland, Vt.; the Claremont Railway & Lighting Company, Claremont, N. H.; the Reading Transit & Light Company, Reading, Pa., and the West Virginia Traction & Electric Company, Wheeling, W. Va. Mr. Rose was connected with the Delaware, Lackawanna & Western Railroad for eighteen years, with J. G. White & Company for seven years as assistant purchasing agent and with the Foundation Company, Ltd., Montreal, for a year and a half as general purchasing agent. He succeeds Mr. F. A. E. Thorling as purchasing agent with Barstow & Company.

Mr. Fred F. Stockwell has been appointed treasurer of the New England Street Railway Club, succeeding the late Edward P. Shaw, Jr. Mr. Stockwell is widely known in the electric railway field as treasurer of the Barbour-Stockwell Company, Cambridge, Mass., manufacturer of special trackwork. He was born in Brattleboro, Vt., but his parents moved to Cambridge soon after his birth, and after attending the local schools Mr. Stockwell learned the machinist's trade in Boston. He entered business with a partner in 1889, and a consolidation of interests led to the incorporation of the Barbour-Stockwell Company in 1893. The new treasurer has been closely identified with the development of electric railway special work since the days of horse traction. He is a charter member of the club and is active in the American Electric Railway Manufacturers' Association.

Col. Timothy S. Williams, president of the Brooklyn (N. Y.) Rapid Transit Company, celebrated twenty years of service with the company and its constituents on July 1. On his arrival at his office on the morning of July 1 President Williams found on his desk a huge silver loving cup filled with American beauty roses—the gift of nineteen men of the company's official staff, whose service with the company has been coextensive with his own. The men who presented the loving cup to Colonel Williams were Messrs. G. H. Beck, E. Brower, T. S. Curley, J. H. Dwyer, G. H. Jackson, W. J. O'Neill, J. F. Throckmorton, J. Weidman, F. J. Spaulding, C. D. Meneely, J. H. Bennington, H. A. Crowe, J. Duffy, W. H. Gordon, A. Maxwell, W. Siebert, J. Walsh, Jr., C. T. Victorine, I. Isaacsen. The loving cup is inscribed on one side with the names of the donors and on the other side bears the following inscription: "To our president and friend, Col. Timothy Shaler Williams, to whose wisdom, foresight and courage is so largely due the conception, nurture and development of the Brooklyn Rapid Transit System to its present proud pre-eminence, from those who have been associated with him for twenty years, who have to some extent shared his labors and who rejoice in his well-earned success."

OBITUARY

Joseph H. Pierson, assistant claim agent of the Terre Haute, Indianapolis & Eastern Traction Company, was killed when his automobile turned over on the evening of June 23, while he was driving from his office to his home at Valley Mills, a few miles south of Indianapolis. Mr. Pierson was born in Wayne Township, Marion County, Ind., in 1870. He was educated in the public schools of his native township and later took a course in the Central Normal College, Danville, Ind. He taught in the schools for several years. Mr. Pierson was active in Democratic politics for many years and was elected as representative to the 1909 session of the Indiana Legislature. He became connected with the claim department of the Terre Haute, Indianapolis & Eastern Traction Company in 1909.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Lauderdale Power Company, Florence, Ala.—Incorporated in Alabama to construct a railway between Florence and Huntsville, 75 miles. Alan Jemmison, Birmingham, president.

Intercity Terminal Railway, Little Rock, Ark.—Incorporated in Arkansas to construct and operate a railway in Little Rock and Argenta. It is reported that the company has been organized to take over the Argenta Railway. Capital stock, $500,000. Officers: C. C. Kavanaugh, president; E. W. Jackson, vice-president, and F. J. Schmutz, secretary and treasurer.

Mississippi Valley Railway & Power Company, Dover, Del.—Incorporated in Delaware to construct railroads and to operate by steam, electricity, or other power. Capital stock, $4,500,000. Incorporators: Charles B. Bishop, Clarence J. Jacobs and Harry W. Davis, Wilmington, Del.

FRANCHISES

Phoenix, Ariz.—The Phoenix Railway has received a franchise from the Council to build a double-track line down Fourth Street from Roosevelt Street to Washington Street and to extend the Monroe Street loop to Fourth Street.

Los Angeles, Cal.—The Council decided on June 26 to advertise for sale a franchise for a street car track covering a distance of 448 ft. on Central Avenue in front of the Southern Pacific Station. The track is to turn in toward the station at a point 69 ft. south of Fifth Street and turn back to the present tracks at a point 448 ft. farther south. The track is desired by the Los Angeles Railway to provide for its passengers easier access to the station than is afforded by the present arrangement. The plan has been indorsed by the board of public utilities and the public utilities committee of the Council.

Los Angeles, Cal.—The Board of Public Works has been authorized by the Council to advertise for bids on the street railway franchise on South Park Avenue. Bids will be received on two sections of the line, the first extending from Jefferson Street to Slauson Avenue, and the second from Slauson Avenue to Florence Avenue.

Hutchinson, Kan.—The Hutchinson Interurban Railway has received from the Council a franchise to extend its line on Second Street from Main Street to a point 300 ft. east of Walnut Street. The Council also granted to the Arkansas Valley Interurban Railway the right to use the Second Street track for reaching its terminal station which will be located at 111 Second Avenue, East, recently purchased.

Pittsburgh, Pa.—In a recent letter to the Council Mayor Joseph G. Armstrong recommended that seventeen out of the twenty-five requests for franchises for curves, additional tracks and sidings made to him by the Pittsburgh Railways be granted. Together with this letter the Mayor submitted to the Council a proposed ordinance in which the conditions under which these franchises should be given were fully stated. The Mayor told the Council that he had prepared his recommendations after conferences with the law department and the Department of Public Works. He asked for immediate action on the part of the Council, inasmuch as conferences with the officials of the Pittsburgh Railways will probably be necessary.

TRACK AND ROADWAY

Birmingham, Ala.—In connection with the proposed electric railway from Birmingham to the Warrior River, it is planned to continue the line to Jasper, about 35 miles from Birmingham. W. W. Shortridge, Birmingham, is interested. [June 26, '15.]

Douglas (Ariz.) Traction & Light Company.—This company is constructing 300 ft. of additional trackage at Camp Douglas, extending the line eastward from its former terminus to a point near the eastern boundary of the Eleventh Infantry camp. It is later intended to extend the

trackage the entire distance to the eastern edge of the camp.

Hoxie Electric Railroad, Calico Rock, Ark.—Plans are being made to revive the project for an electric railroad from Hoxie to Calico Rock. J. W. Myers, Calico Rock, is interested. [Feb. 27, '15.]

Burlingame (Cal.) Electric Railway.—It is stated unofficially in San Francisco that the Burlingame Railway, owned by Ansel M. Easton, Burlingame, and others, will be equipped with the overhead trolley. The road, 2 miles long, has been operated since March 1, 1913, with storage battery cars.

Marin County Electric Railway, Mill Valley, Cal.—Construction has been begun on the first unit of this company's line. This stretch of track will extend from the heart of the town to the upper end of Cascade Canyon. It is expected that the system will eventually be extended to Sausalito. [May 22, '15.]

San Francisco (Cal.) Municipal Railway.—Bids will be received by the Board of Public Works on July 14 for steel rails to be used in the construction of the Church Street municipal railway. The city engineer plans to have the construction of the road contracted for in three parts—one from Van Ness Avenue and Market Street to Church Street and Eighteenth Street; another from Eighteenth Street to Twenty-second Street and the third from Twenty-second Street to Thirtieth Street. The plans for the section from Van Ness Avenue to Eighteenth Street will provide for the construction of two tracks on Market Street from Van Ness Street to Church Street.

Capital Traction Company, Washington, D. C.—The Public Utilities Commission of the District of Columbia has denied the application of this company to build an extension of its lines on Seventeenth Street, I Street, Thirteenth Street, H Street and other streets in Washington.

Orlando (Fla.) Interurban Traction Company.—W. C. Temple, president, reports that the project to build an electric railway to connect Orlando, Kissimmee and Sanford has been abandoned. [April 12, '13.]

Palatka-Hastings Interurban Railway, Palatka, Fla.—This company reports that the project to build an electric railway from Palatka to Hastings has been abandoned on account of the inability to secure permission from the Putnam County Commissioners to use the bridge crossing the St. Johns River upon a basis that would enable it to operate. F. J. Von Angelken, East Palatka, secretary. [Nov. 15, '13.]

***Pearl Harbor, Hawaii.**—Bids are desired until Sept. 18 by H. R. Stanford, chief of the bureau of yards and docks, navy department, Washington, D. C., for the construction of a marine railway at the naval station, Pearl Harbor, Hawaii, according to specification 2172. The appropriation for this work is $94,000.

Lincoln Railway & Light Company, Lincoln, Ill.—This company expects to lay new track on Union Street from Broadway to Tremont Street. The 40-lb. rail now in use will be replaced by 60-lb. rail. The company has laid 80-lb. rail on its Broadway line.

Evansville & New Harmony Traction Company, Evansville, Ind.—This company announces that it has contracted with M. A. Peoples, Chicago, for the financing and construction of its line from Evansville to New Harmony, 30 miles. The line will connect a number of suburban towns in the vicinity of Evansville. It is expected that construction will be begun about Sept. 1. C. J. Seibert, Evansville, general manager. [Nov. 28, '14.]

Louisville & Northern Railway & Lighting Company, New Albany, Ind.—Complete suspension of traffic on Market Street between Washington Street and Vincennes Street has been ordered by the Board of Public Works, while the concrete bed for the new brick pavement is laid and allowed to settle, the railway company transferring passengers from car to car across the intervening square. The city and the Louisville & Northern Railway & Lighting Company are in a controversy as to the nature of a crossing which the company is to construct over Market Street. The city calls for T-rails embedded in cement between the tracks, and the railway wants to use oak planks.

Topeka (Kan.) Railway.—Material has been ordered and work will be begun at once on the extension of this company's line on Kansas Avenue from Seventeenth Street to Twenty-first Street. A bridge across the Shunganunga River will be built in connection with the extension. It is estimated that the bridge will cost about $19,000.

Cumberland & Manchester Railroad, Manchester, Ky.—T. J. Vermillion & Son, Barbourville, have received the contract to construct a 3-mile section of this company's line from Manchester to Barbourville. The route extends via Cannon, Girdler, Hopper and Woollum. M. E. S. Posey, Barbourville, chief engineer. [June 19, '15.]

Brandon (Man.) Municipal Railway.—This company reports that it is constructing 6700 ft. of single track, forming a belt line 5½ miles long.

United Railways, St. Louis, Mo.—This company will construct new tracks on Olive Street between Fourteenth Street and Boyle Avenue, St. Louis.

***Rutherfordton, N. C.**—Plans are being considered to build a line from Rutherfordton to Columbus, about 15 miles. L. D. Miller, Rutherfordton, is interested.

***Dayton, Ohio.**—Plans are being considered to build a railway between Dayton and St. Marys. At a meeting of the citizens of the towns on the proposed line, held at Covington on June 30, Judge Dennis Dwyer of Dayton was appointed chairman of the committee to look after the financing of the line.

Oklahoma (Okla.) Railway.—Plans are being made by this company to reconstruct its tracks from the Rock Island Railroad tracks north on Broadway to Tenth Street and on East Fourth Street.

Sand Springs Railway, Tulsa, Okla.—This company contemplates the construction of an extension of its lines southwest to the oil fields, about 30 miles.

Northampton (Pa.) Traction Company.—Arrangements for the physical connection of the property of this company with the Northampton, Easton & Washington Traction Company across the Delaware River are under consideration and are expected to be completed in the near future.

Philadelphia, Pa.—Bids will be received until Aug. 16 by A. M. Taylor, director department of City Transit, 754 Bourse Building, Philadelphia, for the construction of the City Hall station section of the Broad Street subway under City Hall and Market Street subway and work appurtenant thereto, known as Contract 101. This section will be about 700 ft. long, and will include the underpinning of the west side of City Hall and the Market Street subway. Plans and specifications may be had at Room 748, Bourse Building, upon a deposit of $50 per set, pending return.

Rhode Island Company, Providence, R. I.—Work has been begun by this company laying double tracks on North Main Street between Camp Street and Mill Street, Providence.

Southern Public Utilities Company, Greenville, S. C.—Material has been received and work will be begun at once on the reconstruction of this company's tracks on Whitner Street and South Main Street, Anderson.

Carolina, Greeneville & Northern Railroad, Greeneville, Tenn.—A. H. Jacoby, Greeneville, has been awarded the contract for part of the work of this company's line from Bristol to Knoxville, via Kingsport, Newport and Sevierville, 140 miles. The maximum grade will be 1.5 per cent and the maximum curvature 10 deg. Three steel bridges, aggregating 1500 ft. will be built on the line. H. S. Reed, 205 Grant Building, Los Angeles, president. [June 26, '15.]

Corpus Christi-Ward Island Interurban Railway, Corpus Christi, Tex.—Grading has been begun on this company's line from Corpus Christi to Ward Island, 7 miles. The work of laying track will be begun in about four weeks and it is expected that the line will be completed about Oct. 1. The company plans to develop Ward Island as an amusement park. J. H. Caswell, San Diego, is interested. [May 15, '15.]

Dallas (Tex.) Southwestern Traction Company.—At a meeting of the stockholders of this company on June 21 it was announced that the sale of $60,000 of the company's $2,500,000 of bonds has been authorized. E. P. Turner, Gaston Building, Dallas, president. [June 12, '15.]

Lynchburg (Va.) Traction & Light Company.—In connection with improvements being made by the city, this company plans to double track its line on Main Street.

***Norton, Va.**—Plans are being made to construct a railway from Norton to High Knobs in Stone Mountain, about 5 miles. Patrick Hogan, High Knobs, is interested.

Radford-Willis Southern Railway, Radford, Va.—The contract for constructing this company's line from Willis to Radford has been awarded to Williams Brothers Construction Company, Roanoke. John L. Vaughan, Shawsville, president. [March 13, '15.]

Virginia Railway & Power Company, Richmond, Va.—In connection with the proposed extension of this company's line on West Broad Street from Robinson Street to the corporate limits, officials of the company have stated that further extensions of its lines are practically at a standstill owing to the difficulty in securing the desired legislation, jitney encroachment and general depression. It is stated that at the present time the company finds it impracticable to build the line, and, as the time limit has already expired on the franchise, is prepared to avail itself of the alternative provision of forfeiting the $5,000 bond which it put up as assurance at the time of securing the franchise.

Charleston (W. Va.) Interurban Railroad.—Four miles of track on this company's 25-mile extension from Charleston to Montgomery has been laid and it is stated that cars will be operated between Charleston and Malden, 6 miles above Charleston, by July 15.

***Morgantown & Wheeling Railway, Morgantown, W. Va.**—This company advises that it is extending its line from Cassville to Blacksville, 15 miles. All the grading and masonry is completed with the exception of one bridge 186 ft. long. The bridge is completed and ready to put in place as soon as it is reached by track. Seven miles of track have been completed and are being operated by steam. The company is using 70-lb. A. S. C. E. rails and oak and chestnut ties. It is planned to operate the line by steam for about two years, when it will be operated by electricity.

Weston & Glenville Electric Railroad, Weston, W. Va.—Surveys will soon be begun by this company on its proposed line between Weston and Glenville. Lloyd Rinehart, Weston, is interested. [Oct. 17, '15.]

SHOPS AND BUILDINGS

Connecticut Company, New Haven, Conn.—A new trolley station will be built at Woodmont by this company in the near future. The structure will be of stucco. The cost of the building is estimated at $5,000.

Detroit (Mich.) United Railway.—On July 1 this company removed its interurban station and general offices to the Detroit United Building on the southeast corner of Jefferson Avenue and Bates Street. The waiting room is located on the ground floor with the main entrance on Jefferson Avenue, while the exit to the cars will be on Bates Street, as will also be the entrance to the general offices.

Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, Minneapolis, Minn.—This company announces that it will soon begin the construction of general repair shops at Faribault, Minn.

Citizens' Traction Company, Oil City, Pa.—Announcement has been made by this company that it will erect a modern carhouse on the site of the present structure in Franklin. The building will have a frontage of 52 ft. on Liberty Street and will be 150 ft. deep. The structure will be of brick with concrete floors and rolling steel doors.

POWER HOUSES AND SUBSTATIONS

Pittsburgh (Pa.) Railways.—This company has placed an order with the Westinghouse Electric & Manufacturing Company for four 1800-kw., 600-volt d.c., six-phase sixty-cycle, 514-r.p.m. compound wound commutating-pole rotary converters; twelve 625-kva. single-phase, sixty-cycle, 11,000-volt high-tension to rotary voltage low-tension O. I. S. C. transformers and one thirty-three-panel switchboard to control the above apparatus; also three 1000-kw., 550-volt, commutating pole d.c. generators with 1440-hp., three-phase, sixty-cycle, 10,000-volt, a.c., 514-r.p.m. synchronous motor generator sets with d.c. exciters.

Manufactures and Supplies

ROLLING STOCK

Southern Traction & Power Company, Alexandria, La., will probably purchase two or three cars.

Mobile Light & Railroad Company, Mobile, Ala., is expecting to purchase a number of single-truck cars.

Little Rock Railway & Electric Company, Little Rock, Ark., has ordered three buses from the Southern Car Company.

New York & Queens County Railway, New York, N. Y., noted in the ELECTRIC RAILWAY JOURNAL as expecting to purchase six double-truck cars, has ordered this equipment from the Southern Car Company.

Ogden, Logan & Idaho Railway, Ogden, Utah, has ordered six trailers from the American Car Company, St. Louis, Mo. This item is a correction of a note in last week's issue, in which the name of the contracting carbuilder was erroneously stated.

Connecticut Company, New Haven, Conn., noted in the ELECTRIC RAILWAY JOURNAL of May 15, 1915, as having issued specifications for ninety-two all-steel cars, has ordered forty-six cars from the Wason Manufacturing Company, and forty-six from the Osgood-Bradley Car Company.

TRADE NOTES

Automatic Ventilator Company, New York, N. Y., has received an order to equip with ventilators seven cars of the Union Electric Company, Dubuque, Iowa.

Q. P. Signal Company, Needham, Mass., has erected at Needham a new four-story brick and concrete manufacturing plant 103 ft. x 40 ft. The plant is completely equipped and will be ready for operation in about two months. Special power house apparatus and substation signal apparatus and trolley catchers will be manufactured in the new plant.

General Railway Signal Company, Rochester, N. Y., has received a contract to build a new interlocking plant at the crossing of the Illinois Traction System and Wabash, Illinois Central and Alton railroads at Pontiac, Ill. Work will commence at once and will be completed in ninety days. The plant will be all electric and of the latest type of modern construction, and will have eighty levers.

Universal Safety Tread Company, Waltham, Mass., is now manufacturing all types of its safety treads in its new plant at Waltham, Mass. All the machinery and shops have been moved from Groton, N. Y., where the treads were formerly manufactured, to Waltham, Mass. The new plant is completely equipped with lathes, presses, stamping and special machinery for the manufacture in all its processes of "anti-slip" and lead-filled safety treads used in the transportation and building industries.

Esterline Company, Indianapolis, Ind., manufacturer of "Golden Glow" headlights, has received an order for twenty-four SE-95 headlights from the Shreveport (La.) Railways. This makes a complete installation of this equipment by the Shreveport property. The company reports deliveries of this equipment during June to the following railways: Austin (Tex.) Street Railway; Atchison Railway, Light & Power Company; Chicago & Joliet Electric Railway; Helena (Ark.) Interurban Railway; Arizona Copper Company, Clifton, Ariz.; Sioux City Service Company; Scranton Railway; American Car Company for new cars of the Fort Dodge, Des Moines & Southern Railway; Wichita Railroad & Light Company; Pressed Steel Car Company for new cars of the New York, Westchester & Boston Railway; Des Moines (Iowa) City Railway; Hutchinson Interurban Railway; Denver & Interurban Railroad; Auburn & Syracuse Electric Railroad; St. John (N. B.) Railway; Windsor, Essex & Lake Shore Rapid Railway; Biddison & Crow Interurban Railway, Tulsa, Okla.; San Antonio (Tex.) Traction Company; Cincinnati Car Company for new cars of the Lancaster Traction & Power Company; Union Electric Company; Shreveport (La.) Railways; Seattle (Wash.) Municipal Railway; Trinidad Electric Transmission Railway & Gas Company; Hocking-Sunday Creek Traction Com-

pany; Wisconsin-Minnesota Light & Power Company; Georgia Railway & Power Company; Denver Tramway; Ephrata & Lebanon Traction Company; South Carolina Light, Power & Railways Company; Northern Texas Traction Company; Tarentum, Brackenridge & Butler Street Railway; Binghamton (N. Y.) Railway, and Topeka (Kan.) Railway.

ADVERTISING LITERATURE

Walter A. Zelnicker Supply Company, St. Louis, Mo., has issued a folder listing its various types of rolling stock and other railway equipment.

G. M. Gest, New York, N. Y., contracting conduit engineer, has issued a folder which contains a map on which are designated the various cities where he has completed contracts.

Walter A. Zelnicker Supply Company, St. Louis, Mo., has issued a price list of its second-growth hand-shaved hickory handles for use as axe, hammer, hatchet and pick handles in railroad work.

L. S. Brach Supply Company, New York, N. Y., has issued a catalog describing its types 36 and 40 vacuum arresters, mica shield protected, to meet the requirements of telephone train dispatching.

General Electric Company, Schenectady, N. Y., has just issued Bulletin No. 44,712, which illustrates and describes G-E lightning arresters for electric railway service, both in the station, on the line and on the car. This bulletin supersedes the company's previous bulletin, No. A-4135.

Tool Steel Gear & Pinion Company, Cincinnati, Ohio, has issued a folder on its tool steel gears and pinions, also a reprint from an article by T. C. Goodyer in the *Tramway & Railway World* which contains data showing the greater length of life of treated as compared with untreated gears.

Railway & Industrial Engineering Company, Pittsburgh, Pa., has issued advertising sheets describing and illustrating the Burke switching and protective apparatus, high-voltage air-break switches, horn-type fuses, improved horn-type lightning arrester and choke coil, and combination horn-type fuse and series horn-gap lightning arresters and choke coil.

Rail Joint Company, New York, N. Y., has issued an attractive catalog illustrating its continuous, Weber and Wolhaupter rail joints as applied to A. R. A. Series A and B rails, guard rails, frogs and switches, T-rails and girder rails. Illustrations are also shown of the different types of joints with fiber and with wood insulation, the "twin" insulated rail joint and the step rail joint.

Ohmer Fare Register Company, Dayton, Ohio., has issued a folder on its fare register system. The folder states that the *Denver Tramway Bulletin,* referring to the monthly list of conductors' Ohmer efficiency grades records that the general average for the entire system for April broke all previous records. This company has also issued an advertising blotter on its fare register system.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued in pamphlet form a paper entitled "Considerations in the Design of Railway Motors," a treatise on the ventilation of this type of motor, by R. E. Hellmund. This paper is a reprint of an article which appeared in the ELECTRIC RAILWAY JOURNAL of May 1 and also the *Electric Journal* and goes very thoroughly into this important subject. A large number of illustrations are used showing practice in ventilating motors, together with diagrams showing the air currents through the windings and cores of the armatures.

Electric Service Supplies Company, Philadelphia, Pa., has issued a general catalog on the Garton-Daniels lightning arresters. The catalog is divided into four sections, so arranged as to make easy the selection of proper apparatus for any set of conditions. Part I contains descriptions and price lists of a.c. arresters up to 20,000 volts, d.c. arresters up to 2400 volts, arc circuit lightning arresters for both a.c. and d.c. circuits, panel-board arresters, and lightning arrester cross-arm hangers. Part II contains a description and price lists on choke coils and disconnecting switches. Part III deals thoroughly with the subject of lightning phenomena as regards the construction and operation of a.c. and d.c. arresters. Part IV contains valuable information accompanied with diagrams on the installation of lightning arresters, their grounding, distribution, and inspection.

Sangamo Electric Company, Springfield, Ill., has issued Bulletin No. 41, which describes and illustrates its "economy" electric railway meters, for use in aiding motormen to increase their efficiency by saving energy in operation. These meters are of two varieties, ampere-hour meters and watt-hour meters. They are both of the mercury motor type and therefore have all the advantages inherent to mercury flotation, the chief of which is immunity from damage due to vibration and shock. Through the use of these meters it is claimed that the motorman will take active interest in his car or train in that he will look for troubles and promptly report all defects for repair. The catalog contains tables and data concerning the use of these meters on the Chicago & Milwaukee Electric Railroad and shows the saving in power consumption per car-mile effected thereby. Testimonial letters from the Chicago & Joliet Electric Railway and the Rockford & Interurban Railway are also included which are significant in showing the saving brought about on these lines.

Trussed Concrete Steel Company, Detroit, Mich, has issued a comprehensive 128-page publication on its united steel sash. The book covers all the various types of sash with its applications in building construction. The first portion of the book is devoted to the general discussion of the features of steel sash construction, covering the questions of strength, weathering, workmanship, daylighting, ventilation, hardware, and glazing. The large variety of sections that are combined to make up steel sash are described in the next portion of the book, including among them the mullions. Standard pivoted sash is next thoroughly covered, including the horizontally and vertically-pivoted sash of all types. Continuous sash of the top-hung and center-pivoted type are comprehensively covered with numerous pages of details. Vertical-sliding sash represents the most recent development in steel-sash construction, and a large amount of space is devoted to the various types, including vertical-sliding sash with removable jamb guides, counter-balanced sash, counter-weighted sash and spring-balanced sash. Horizontal-sliding sash is also indicated at this point. Partitions and steel sliding and swinging doors are shown. The remaining portion of the book is devoted to photographic reproductions of important installations. One page contains illustrations of the attractive stations and shops of the New York, Westchester & Boston Railway where these windows are used. They are also shown in views of a paint shop of the Los Angeles (Cal.) Railway and a power house of the Philadelphia (Pa.) Rapid Transit Company.

NEW PUBLICATIONS

Proceedings of Sixth Annual Convention Pacific Claim Agents' Association, Spokane, July 9-11, 1914. 79 pages. Paper.

This book contains a list of the officers and committees of the Pacific Claim Agents' Association, and presents the running discussions, papers and reports before the convention in Spokane last year. A general index permits the ready finding of any desired information.

Human Nature and the Railroad, by Ivy L. Lee, published by E. S. Nash & Company, 620 Sansom Street, Philadelphia, Pa., 129 pages. Price, $1.

Mr. Lee's easy style and analytical reasoning are well known through his contributions to the popular and technical press and his addresses before various bodies. The present volume is made up of ten of these addresses, and while they will be of interest and instruction to the general public because they tell the story of the railroad, they are equally of interest and instruction to the railway official because they explain to him his weaknesses and foibles, tell him the importance of telling the story and how to tell it as well as to live up to the story. The purpose, as explained by the author, is to establish a point of contact, to make the railroad manager, the employee and the public in their mutual relations understand one another's point of view. We hope that the volume will be widely read so that this wish will be fulfilled.

The Tale of the Peacock

(The Hand Brake with Air Brake Efficiency)

Safety First Slogans
VS.
Safety First Equipment

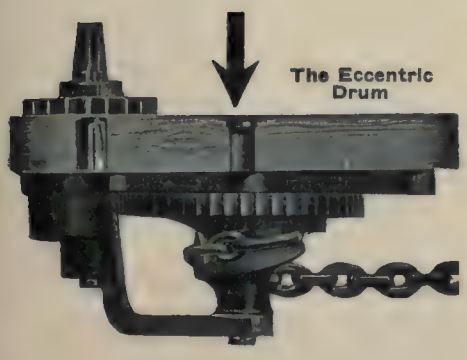
The road placed "Safety First" signs both inside its cars and out.

Yet some of its cars had the common staff brake only.

Those were *dangerous* cars carrying *safety* emblems. Safety campaigns to be effective, must be backed up with safety equipment.

Geared handbrakes are safe brakes in proportion to the amount of real engineering put into their design —the Peacock Improved Brake is the safest brake made. The automatic stop, an exclusive feature of this brake, is one point of superiority bearing directly on safety.

Write for Bulletin 5
which "bunches the hits"



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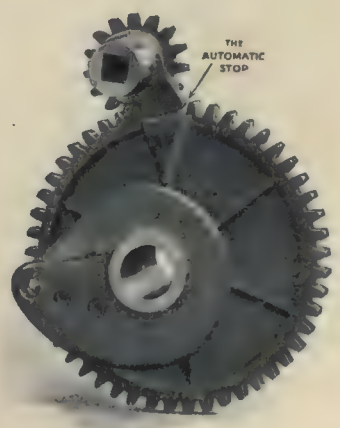

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Safety — not at *all* costs, but at *small* costs.

—*PROVIDENCE FENDERS*

From the Public Service Railway Co. Safety Campaign

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The Consolidated Car Fender Co., Providence, R. I.
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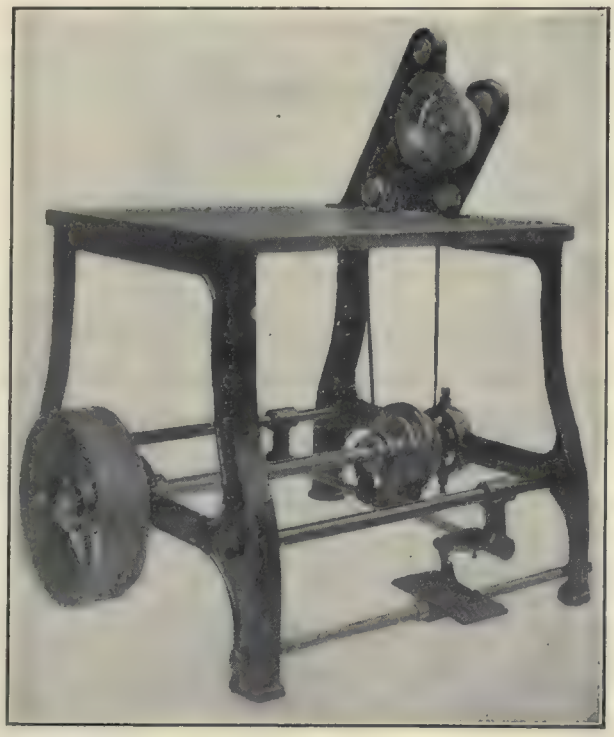
It is just as Important to Tape Your Coils Tightly as it is to do it Swiftly



Your coils must be taped *tightly,* if they are to be taped *rightly.* Besides, it uses less tape. You will learn how *tight* taping and *swift* taping may be best combined if you investigate the

Columbia Coil Taping Machine

Do yourself the justice of looking into the merits of this machine. And while you are looking over Columbia Coil Winding and Columbia Coil Taping Machines it would pay you to take a glance at some of the many other Columbia products.

Probably many of our car and shop specialties might save you money if you only knew it. Get Bulletins and see.

Axle and Armature Straighteners.
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Is That Car Equipped For Safe Operation?

The hazard of fire is constant wherever electric currents are involved. You cannot tell when a motor burn-out will occur, endangering life and property, or when the car will be struck by lightning.

The ounce of loss prevention is in the

Pyrene TRADE MARK

FIRE EXTINGUISHER

which not only means protection against serious fires, but safe handling of fires, since its dielectric character prevents any short-circuiting by the stream through the body of the operator.

Fall in line with modern railway practice,

"Pyrene" your road.

Meanwhile send for the booklet "Pyrene For Electric Service." It will interest you.

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Having Trouble With Over-Lapping and Non-Uniform Tariffs?

Then you are invited to consult our Service Department — without any compensation or obligation on your part.

Our staff numbers experts who have made all questions relating to fares their special study. Their experience is at the disposal of those who have tariff conditions that stand in the way of efficient operation.

At your service
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Write us.

The Bonham Recorder Co.

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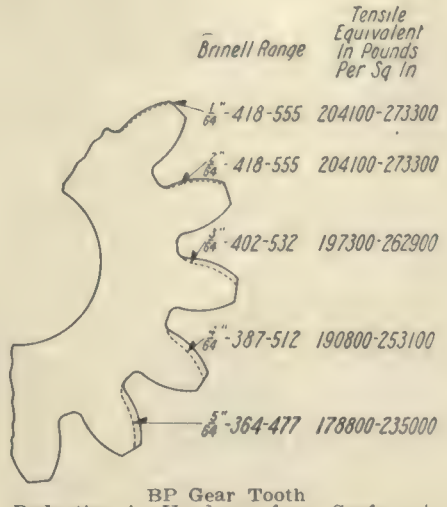
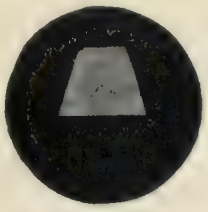
BP Motor Gearing



BP Gear Tooth
Reduction in Hardness from Surface to Center



B P Tooth Showing Refinement of Structure

No. 3

B P Motor Gearing has a nearly "File hard" surface. This hardness does not extend uniformly through the teeth but gradually reduces toward the center or core, with a corresponding increase in toughness—giving High Surface Hardness without brittleness.

The great strength of BP Gearing makes it practical to use under the most severe service conditions. Its Toughness and Ductility eliminate breakages.

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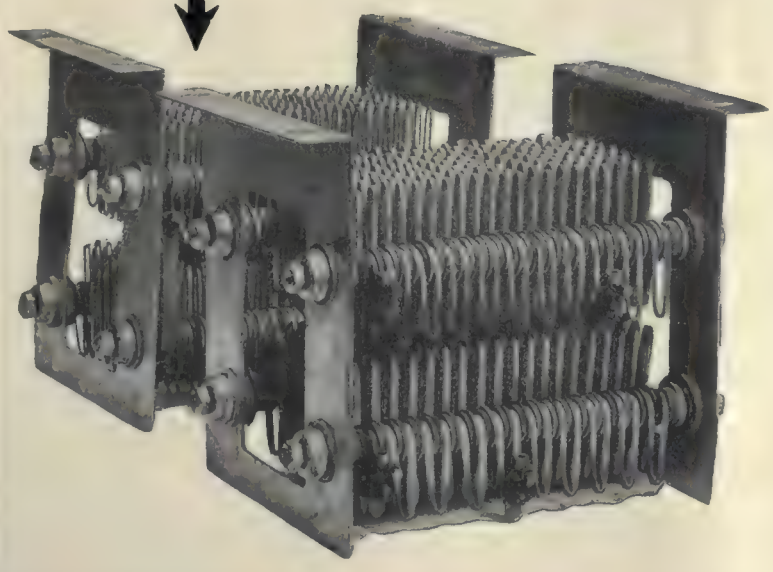
Nuttall - - - Pittsburgh



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Coming at a time when attention is concentrated on cutting maintenance cost and reducing the weight of cars, its wide adoption was inevitable.
Note this—that it is drawn—not cast. That it is, therefore, of uniform diameter—so that local fusing cannot occur. That the drawing prevents the formation of destructive blow holes and flaws. It lasts as long as the car on which it is placed—does it without attention.
Consider economy—then send for the data sheet as a prelude to quotations on trial equipment.

The Ellcon Co.

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Save on Power and Maintenance

Rollway Bearings

Decreased friction due to "ROLLWAY" bearings results in substantial economy in power. Cars can "coast" more frequently and further. The life of motors is prolonged.

The fixed adjustment makes the bearing extremely simple, it cannot be wrongly assembled. Boxes are oil-tight and dust-proof. That is where the maintenance saving comes in. *Write for the figures.*

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Open Hearth and Bessemer
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Rolled in the old way—the Cambria way. Slow reduction from ingot means maximum density and homogeneity.

Our axles represent the highest development in the art of heat treating. Axles for street and interurban lines, our Specialty.

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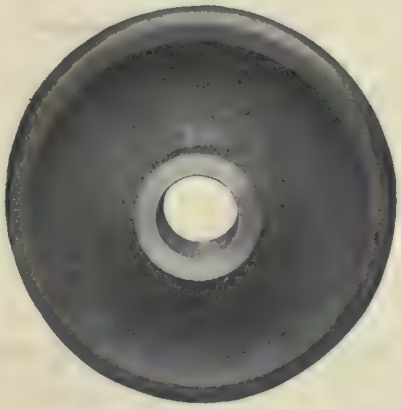
Weight, Size and the Proper Proportioning of Metal Are Distinct Factors in Car Wheel Mileage



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FOR ALL CLASSES OF SERVICE

The basic principle contributing to the success of the F. C. S. Wheel is primarily non-homogeneous metal, that is, the wheel is composed of metal of different degrees of hardness and texture to correspond to the particular function each part of the wheel is called upon to perform.

For example, the surface of flange and tread is of 3½ per cent carbon white iron (harder than tool steel), specially chilled to reduce abrasion to a minimum.

The plates of the wheel are made of a soft strong metal that will successfully withstand the shocks of strains and service.

The hub of the wheel is sufficiently soft to permit of easy machining and possesses sufficient elasticity to *give* and to hold the proper pressure against the axle to prevent loose wheels.

It is clearly apparent that a homogeneous material cannot possess all the qualities required by the perfect wheel. You will find yourself well repaid by investigating the merits of the F. C. S. Wheel.

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PLANTS: Chicago Detroit Denver Los Angeles St. Paul Tacoma Kansas City Boston

There's no leak proof ring but the LEAK-PROOF Ring — insist

Is It Worth While to Eliminate Scored Cylinders?

That's one item of expense connected with Air Compressor operation you can certainly cut out permanently by using

Made in all sizes

Easily Adjusted

Piston Head Packing Rings

Made by McQuay-Norris Mfg. Co.

The two-piece ring without segments or springs—therefore no corners can develop which score the cylinder or wear it out of round. You are saved the expense of frequent repairs and renewals and the extra tax upon the motor caused by excessive friction.

LEAK-PROOF Rings effect other important economics because they are leak-proof in fact and effectively check all compression losses. A thoroughly fair and reliable test proved that they will produce 90 lbs. pressure in two-thirds of the time required by the segment type of ring. It will pay you to know more about LEAK-PROOF Rings.

We will send you a set of Rings free for you to make any test you wish.

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Dallas—509 Juanita Bldg.

Look for the name LEAK-PROOF stamped on the Ring

JULY 20 IS THE DAY

On July 20th the New Standard Handbook will be ready for delivery.

This date is final.

For the long delay we have apologies, but no regrets, for in this time the contributors and special editors employed for the purpose have gone through every line of proof, searching for errors, adding new data and polishing the product.

The New Standard will be the standard even more certainly than the old.

It is the product of over sixty of the leading engineers of the country—the strongest staff of engineers and specialists that has ever been engaged in a handbook, perhaps even on any engineering work.

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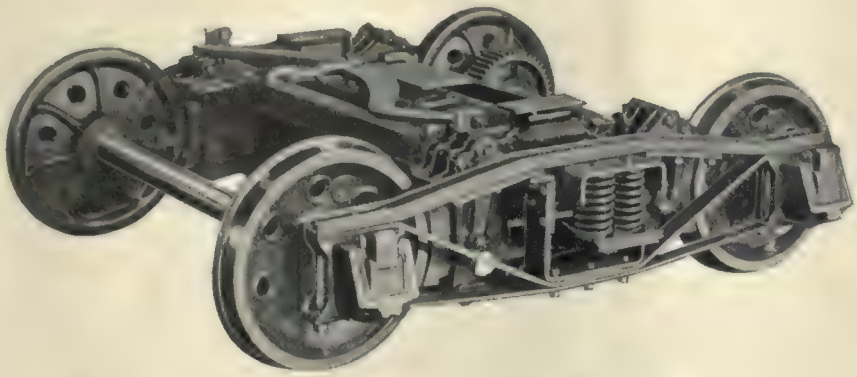
The Baldwin Class "C" Truck



Baldwin Truck, Class 68-18-C, built for Westmoreland County Ry. Co.

is a light-weight, arch-bar design, representing a type that has proved unusually successful in railway work. The truck illustrated has a carrying capacity of 18,000 pounds on the center-plate, and operates at speeds up to 35 miles per hour. The sharpest curves on the line are of 40 feet radius. This truck is fitted with the bolted brake work with compression springs, which insures freedom from chattering and from parts working loose. This is a valuable safety feature.

Highest Award for Trucks at Panama-Pacific International Exposition.

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A. Wm. Hinger, 722 Spalding Building, Portland, Ore.
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Jewett Steel Cars

Represent highest class workmanship from a thoroughly modern plant.

Let us figure on your new equipment.

The Jewett Car Company
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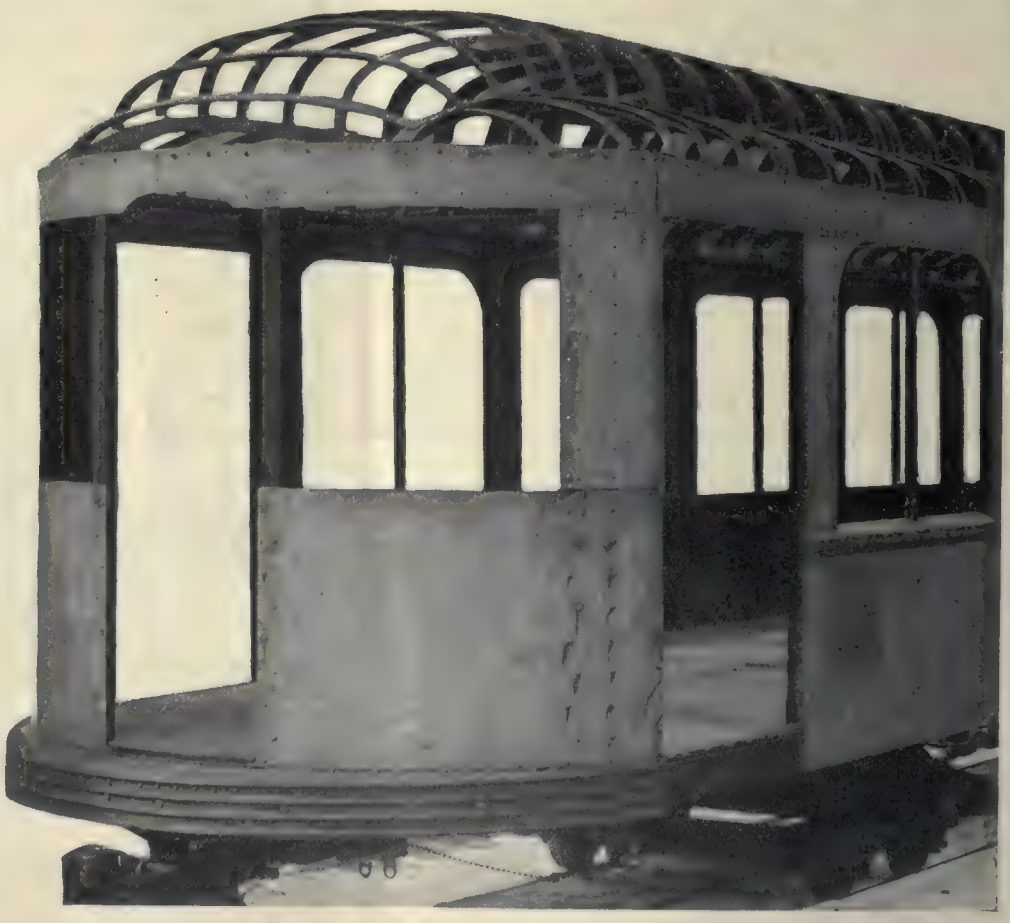

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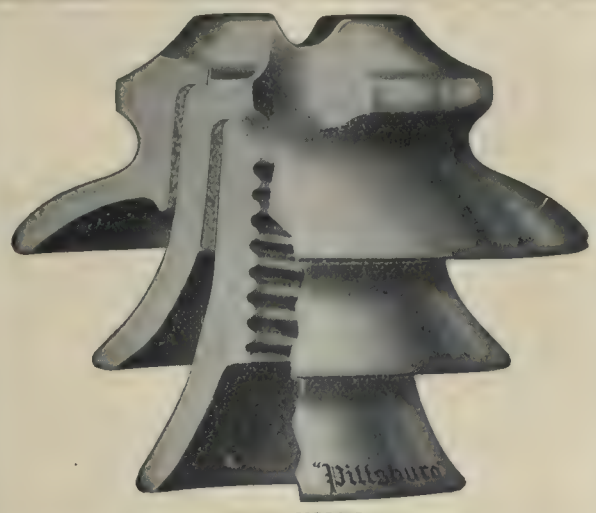

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You Are Never in Doubt

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Pittsburg High Voltage Insulators

Your Lines Are Always Amply Safeguarded

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"Of Unvarying Excellence"

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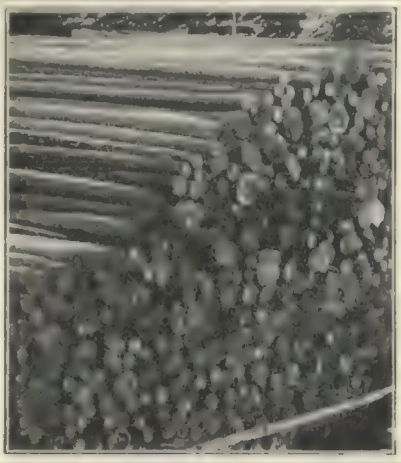

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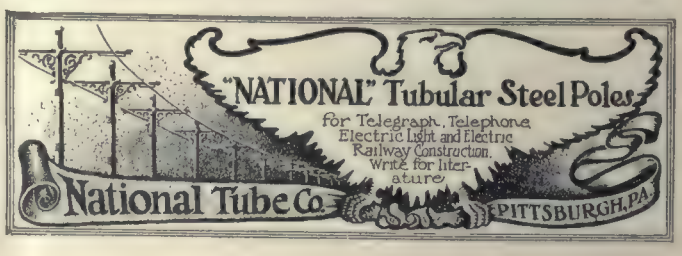

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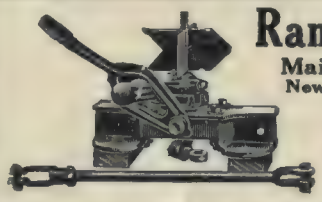

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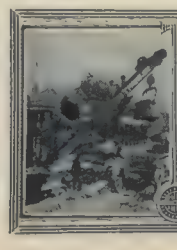

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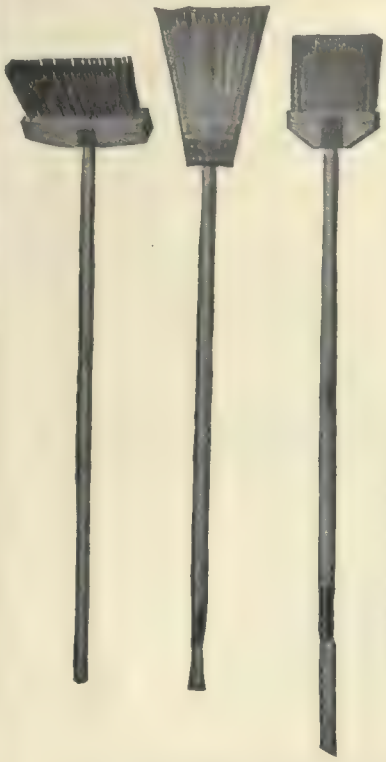

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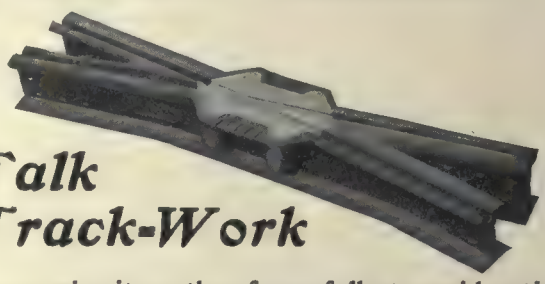

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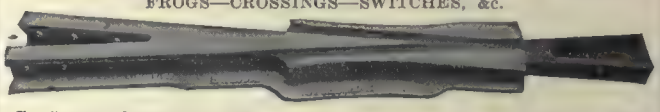

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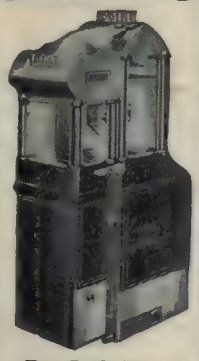

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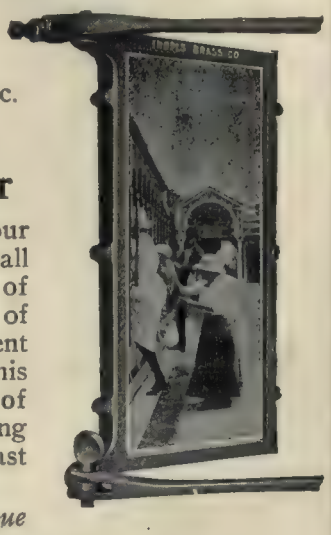

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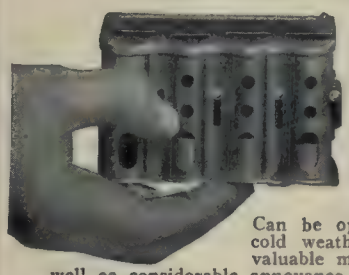

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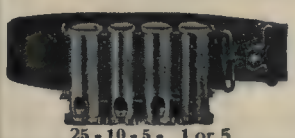

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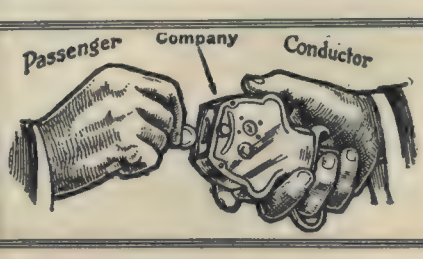

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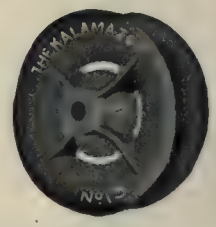

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Car Gongs of all kinds
Rotary and Single Tap Gongs

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We have proved the month in and month out serviceability of

Nungesser
Carbon and Metallic Brushes

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Will you match your time against our time and expense to either correct any brush troubles you may have, or to improve present conditions?

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Chicago Office:
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J. C. Kyle, Engineer

Le Carbone brushes are demanded by those who know all the effects of carbon brushes on yearly maintenance cost. Efficient—Uniform.

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"the Reliable Brush"

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An extra powerful and handy Jack for extra difficult jobs.

Forged Parts are Special Heat Treated

This Jack can be worked from many angles to load, yet full lifting power is available from any position. Write for catalog, details and price.

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The National Standard for Car Curtains and Car Upholstery

AGASOTE HEADLINING

The only headlining made in one solid piece. Will not separate, warp or blister. Waterproof and homogeneous.

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No Spark Brushes

Save Commutators, Power, Brush Cost

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Car Roof Preservation
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Bayonne Car Roofing

The waterproof, sun-proof, storm-proof, age-proof specially prepared canvas roofing.

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The "Hycap-Exide" Battery
for
STORAGE BATTERY STREET CARS
THE ELECTRIC STORAGE BATTERY CO.
PHILADELPHIA

SEARCHLIGHT SECTION

FOR SALE

2—28′ 10″ Paywithin Cars, 4 G.E. 80 motors, Brill 27 G Trucks, AA1 Air Brakes.
1—Double Truck Sprinkling Car, 4,000 gallons capacity.
30—Brill 20′ Closed Cars, G.E. 1000 M., Brill 21-E Tr.
20—Jones 20′ Closed Cars, G.E. 52 Motors, Bemis Trucks.
2—Jackson and Sharp 18′ Car Bodies.
10—42′ Kuhlman Int. Cars, Bald. Tr., 4 Wgh. 121 Motors.
20—Comb. Int. Cars, Bald. Trucks, 4 Wgh. 119 Motors.
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1—Jackson and Sharp 18′ Car Body.
4—Brill 30′ Express Cars, Brill 22-E Trucks.
9—Brill 30′ Express Cars, complete, 4 G.E. 1000 Motors, AA1 Air Brakes, Brill 27-G Trucks.
10—Wason 10 B. Open Cars, G.E. 1000 Motors, Bemis Tr.
5—Brill 10 B. Open Cars, West 12A M., Brill 21-E Trucks.
8—Brill 14 B. Open Cars, Wgh. 56 Motors, Brill 22-E Tr.
8—West. 101B-2 Railway Motors, complete.
40—G.E. 90 Railway Motors, complete.
20—G.E. 66 Railway Motors, complete.
103—G.E. 88-B brand new Motors, complete.
12—G.E. 73 Railway Motors, complete.
24—G.E. 87 Railway Motors, complete.
20—G.E. 57 Railway Motors, complete.
20—G.E. 80 Railway Motors, complete.
12—G.E. 54 Railway Motors, complete.
60—G.E. 1000 Railway Motors, complete.
60—G.E. 800 Railway Motors, complete.
30—West. 12A Railway Motors, complete.
32—West. 49 Railway Motors, complete.
8—West. 38B Railway Motors, complete.
10—West. 112 Railway Motors, complete.
4—West. 68-C Railway Motors, complete.
4—West. 68 Railway Motors, complete.
22—G.E. 80 Armatures, brand new.
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4—G.E. 67 Armatures, brand new.
18—G.E. 57 Armatures (second-hand), two turn.
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3—West. 101-B2 Armatures, brand new.
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3—West. 93A Armatures, brand new.
22—K6 Controllers. 62—K10 Controllers.
44—K11 Controllers. 30—K14 Controllers.
28—K2 Controllers. 28—B29 Controllers.
2—Sets Brill 27G Trucks, 4′ 6″ wheelbase.
6—Brill 21E Trucks, 7′ 6″ and 8′ wheelbase.
10—Dupont Trucks, 7′ 6″ wheelbase.

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1—300 KW. Westinghouse, 3 phase, 600 volts, D.C., 600 RPM., 500 amps., 370 volts AC., with starting motor.
1—100 KW. Gen. Elec., type TC, form A, 550 volts, 182 amps. DC., 340 volts AC., 1200 RPM.

25 CYCLE ROTARY CONVERTER

1—300 KW. Allis-Chalmers, 3 phase, 6 pole, 650 volts, 462 amps., 500 RPM.

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MOTOR and TRAIL

Write for Price and Full Particulars to

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Commonwealth Bldg. Philadelphia, Pa.

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FOR ALL THE STANDARD
STREET RAILWAY MOTORS

GET OUR PRICE WE CAN SAVE YOU MONEY

America's Greatest Repair Works

CLEVELAND ARMATURE WORKS, Cleveland, O.

POSITIONS WANTED

ELECTRICAL engineer, technical graduate, 15 years' practical experience with General Electric, Westinghouse and public utility companies in engineering, construction and operation. Age 36, married; A-1 references. Box 773, Elec. Ry. Jour.

I AM 22 years of age; height 5 ft. 11 in.; weight 150 lbs.; have had three years' experience as conductor and motorman; would now like to file application for position with some interurban railway company. Can furnish good references. Box 784, Elec. Ry. Jour.

PURCHASING agent wants position; 32 years of age and married. Eight years' experience with one of the largest street railways in America. Can furnish first class recommendations. Box 781, Elec. Ry. Jour.

TRACK foreman, roadmaster or engineer—Situation desired by graduate technical engineer experienced as foreman, inspector, chief clerk way and structures department, purchasing agent, twelve years' experience, nine with Stone & Webster; best references; hustler; salary desired $100 month. Box 769, Elec. Ry. Jour.

WANTED—A position as superintendent of track and ways or roadmaster, by a man, age 39 years, with 24 years' practical experience in all branches of steam, street and interurban railway construction and maintenance work. At present employed as roadmaster. Best of references. Desired change not compulsory. Box 777, Elec. Ry. Jour.

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YOUNG man, 35, 6 years with best interurban; 1½ years with manufacturing company. Not a technical graduate, but a practical man. Familiar with high tension, trolley, A. C. block signals, mechanical interlocking plants, latest railway dispatcher's telephone and telegraph circuits. Capable of handling crews, accustomed to estimating. Progressive, reliable and good organizer. Would consider anything from lineman up, if chance for advancement. Will go anywhere. References. Box 786, Elec. Ry. Jour.

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The Esterline Company, Indianapolis, Indiana, manufacturers of "Golden Glow" headlights, desires sales representatives for the States of North Carolina, South Carolina, Georgia, Florida, Eastern Tennessee and Eastern Kentucky. Exclusive proposition for salesmen handling electric railway supplies. State lines represented, references, etc. Box 780, Elec. Ry. Jour.

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Get Your Wants into the Searchlight

SEARCHLIGHT SECTION

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2—General Electric 1000 K.W., 600 v., 360 R.P.M., type "HC." comp. wound, 6 phase. Complete with air cooled 2300 v. trans., reactances and panels.
2—General Electric 500 K.W., 575 volt, 600 R.P.M., type "H.C." comp. wound, 6 phase. Complete with air cooled trans., 2300 v. reactances and panels.
1—300 K.W. Westinghouse, 600 volt D.C., 370 volt A.C., 600 R.P.M. with oil cooled G.E. trans. 11,000 v. primary.
1—200 K.W. Westinghouse, 600 volt D.C., 370 volt A.C., 720 R.P.M.
Also following transformers:
3—125 K.W. G.E. 2400 volts prim., 370 volts sec.
6—75 K.W. Ft. Wayne, 10,000-9000-185-370 v.
3—175 K.W. Stanley, 10,000-2300 volts.

25 Cycle, Rotary Converters

1—500 K.W. General Electric, 3 phase, 25 cycle, 600 volt D.C., 370 volt A.C., 375 R.P.M.
2—300 K.W. Genl. Elect., 3 ph., 25 cycle, 750 R.P.M., 600 volts.
1—250 K.W., Genl. Elect., 3 ph., 25 cycle, 500 R.P.M., 600 volts.
Can also furnish transformers—all voltages.

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8—**75 H.P. Westinghouse, 112 Railway Motors,** 600 volts, newly rewound armatures, full commutators, rebuilt entirely. Will be sold fully guaranteed, upon any reasonable terms of payment.
12—**G.E. 57 Motors,** 50 H.P. Each.
16—**G.E. 67 Motors,** 40 H.P. Each.
20—**G.E. 201 Motors,** 65 H.P. Each.

Booster Set

Generator—West'gh'se 70 K.W., 350 volt, 200 amp. series wound.
Motor—West'gh'se 105 H.P., 575 volt, 950 R.P.M., type "SA" shunt wound.
Complete with coupling and panel.

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ENGINES—BOILERS—MOTORS—CONDENSERS—ETC.

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Address

Eastern Wisconsin Ry. & Lt. Co.
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250 Tons 9″ 90 lb. Grooved Girders
62 foot lengths

Unusually good condition. Very Low Price to Move Quick.
Have many other rail bargains.

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What you get out of *your* Electric Railway Journal

depends upon the time and thought you put into the reading of it.

Thought, time, energy and money are expended in abundance to make each issue of maximum value to the greatest possible number of readers. You benefit by this expenditure in direct proportion to the attention which you give to your paper.

A mind alert for suggestions will find in every issue food for thought and help in its daily tasks. This applies to the reading of the advertising pages, as well as to the reading of the text.

Remember that electric railway progress is due as much to the efforts of the engineers engaged in developing new equipment for manufacturers as to those who buy and use what these manufacturers tell about in their advertisements.

These engineers who give their talents to the manufacturing branch of the industry are always ready to give the benefit of their study and experience to their fellows in the field. An inquiry addressed to the advertiser is usually all that is required. It will receive prompt attention whether or not you are in the class of potential buyer at the time.

Advertisers know the advantage of giving full and reliable information to everybody in the field who indicates his interest in anything relating to the advertised product.

Make the Most of It

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Over 300 different products are here listed.

The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

Accountants.
Gr[illegible]s Corporation, H. E.

Acetylene Apparatus. (See Cutting Apparatus, Oxy-Acetylene.)

Acetylene Service.
Oxweld Acetylene Co.
Searchlight Co., The.

Advertising, Street Car.
Collier, Inc., Barron G.

Alloys, Steel and Iron
Titanium Alloy Mfg. Co.

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Anchors, Guy.
Johns-Manville Co., H. W.
Westinghouse Elec. & M. Co.

Automobiles and Busses.
Brill Co., The J. G.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles.
Brill Co., The J. G.
Cambria Steel Co.
Carnegie Steel Co.
Cincinnati Car Co.
National Tube Co.
Niles Car & Mfg. Co.
St. Louis Car Co.
Standard Steel Works Co.
U. S. Metal & Mfg. Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
American General Eng'g Co.
Columbia M. W. & M. I. Co.

Badges and Buttons.
International Register Co., The

Bankers and Brokers.
Halsey & Co., N. W.

Batteries, Dry.
Johns-Manville Co., H. W.
Nungesser Carbon & Battery Co.

Batteries, Storage.
Electric Storage Battery Co.
Esterline Co.

Bearings, Center.
Baldwin Locomotive Works.

Bearings and Bearing Metals.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G
St. Louis Car Co.

Bearings, Roller and Ball.
Hess-Bright Mfg. Co.
Railway Roller Bearing Co.

Bells and Gongs.
Brill Co., The J. G.
Electric Service Supplies Co.
Ohio Signal Co.
Reiter, G. C.
St. Louis Car Co.

Benders, Rail.
Niles-Bement-Pond Co.

Blow Torches for Soldering and Brazing. (See Cutting Apparatus, Oxy-Acetylene.)

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co.
Johns-Manville Co., H. W.

Boiler Coverings.
Johns-Manville Co., H. W.

Boiler Graphite.
Dixon Crucible Co., Jos.

Boiler Tubes.
National Tube Co.

Boilers.
Babcock & Wilcox Co.

Bond Clips.
Electric Railway Improv. Co.

Bond Testers.
American Steel & Wire Co.

Bonding Apparatus
Oxweld Acetylene Co.
Searchlight Co., The.

Bonding Tools.
American Steel & Wire Co.
Electric Railway Improv. Co.
Electric Service Supplies Co.

Bonds, Rail.
American Steel & Wire Co.
Electric Railway Improv. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Roebling's Sons Co., John A.

Book Publishers.
McGraw-Hill Book Co., Inc.

Boring, Tools, Car Wheel.
Niles-Bement-Pond Co.

Braces, Rail.
Kilby Frog & Switch Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Piling and Lumber.)
American Bridge Co.
Electric Service Supplies Co.
Lindsley Bros. Co.

Brake Adjusters.
Anderson Brake Adjuster Co.

Brake Shoes.
American Brake S. & Fdy. Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.
Railway Materials Co., The.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts.
Anderson Brake Adjuster Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
National Brake Co.
St. Louis Car Co.
U. S. Metal & Mfg. Co.
Westinghouse Traction Brake Co.

Brazing. (See Welding.)

Bridges and Buildings.
American Bridge Co.

Brooms, Track, Steel or Rattan.
Paxson Co., J. W.

Brushes, Carbon.
Calebaugh Self-Lubricating Carbon Co.
Dixon Crucible Co., Jos.
General Electric Co.
Jeandron, W. J.
LeCarbone Co.
Morgan Crucible Co.
Nungesser Carbon & Battery Co.
Westinghouse Elec. & M. Co.

Bumpers, Car Seat.
Electric Service Supplies Co.
Imperial Rubber Co.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.

Bunkers, Coal
American Bridge Co.

Bunting.
Boyle & Co., Inc., John.

Bushings, Fibre.
Diamond State Fibre Co.

Bushings, Rubber.
Imperial Rubber Co.

Buttons. (See Badges and Buttons.)

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc., see those Headings.)

Car Trimmings. (For Curtains, Doors, Seats, etc., see those Headings.)

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Cincinnati Car Co.
Jewett Car Co.
Kuhlman Car Co., G. C.
Niles Car & Mfg. Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.

Castings, Composition or Copper.
Anderson M. Co., A. & J. M.

Castings, Gray Iron and Steel.
American B. S. & Fdry. Co.
American Bridge Co.
American General Eng'g Co.
Columbia M. & W. & M. I. Co.
Falk Co.
Long Co., E. G.
St. Louis Car Co.
St. Louis Steel Fdry. Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.

Castings, Malleable and Brass.
American B. S. & Fdry. Co.
American General Eng'g Co.
Long Co., E. G.
St. Louis Car Co.

Catchers and Retrievers, Trolley.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Long Co., E. G.
Wood Co., C. N.

Ceiling, Car.
Pantasote Co.

Change Carriers.
Etter, Chas. F.
McGill Ticket Punch Co.

Cheese Cloth.
Boyle & Co., Inc., John.

Circuit Breakers.
Cutter Electrical & Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Clamps and Connectors, for Wires and Cables.
American General Eng'g Co.
Anderson M. Co., A. & J. M.
Electrical Engineers Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Klein & Sons, M.
Standard Railway Supply Co.
Westinghouse Elec. & M. Co.

Cleaners and Scrapers, Track. (See also Snow-Plows, Sweepers and Brooms.)
Brill Co., The J. G.
Cincinnati Car Co.

Cleats, Car Wiring.
General Electric Co.

Clusters and Sockets.
General Electric Co.

Coal and Ash Handling. (See Conveying and Hoisting Machinery.)

Coil Banding and Winding Machines.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Coils, Armature and Field.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Roebling's Sons Co., J. A.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines.
International Register Co., The
Johnson Fare Box Co.

Commutator Slotters.
American General Eng'g Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Wood Co., Chas. N.

Commutator Truing Devices.
American General Eng'g Co.
General Electric Co.

Commutators or Parts.
American General Eng'g Co.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
Westinghouse Elec. & M. Co.

Compressors, Air.
Curtis & Co. Mfg. Co.
General Electric Co.
Westinghouse Trac. Br. Co.

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So when they put Iceland on the water wagon the natives had to establish new standards for judging men.

The new conditions established now show them that they previously had no idea of what a change for the better could be made by a shift to aqua pura.

Booze to them was a matter of choice, they chose it and were inefficient. Water was *prescribed* for them and now they are *efficient*.

In the same way, brushes should never be a matter of choice—they should be *prescribed* by the brush manufacturer.

When **Morganite Brushes** are prescribed the services upon which they are to be used determines the grade.

The Morgan Crucible Company Limited
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Factory, Brooklyn

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Electrical Engineering & Mfg. Co.
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The Highest Grade Portable Instruments Ever Produced!

Weston

Model 45 D. C. Portable Ammeters and Voltmeters

Designed to meet the demand for a medium-priced Ammeter and Voltmeter. They are guaranteed to be of sufficient accuracy (one per cent) for general testing in electric power plants, or for outdoor work.

They are shielded from the influence of external magnetic fields, the movement and magnetic system being enclosed in an iron case permanently mounted in a handsome wooden carrying-box with hinged cover.

The scale has a mirror over which the knife-edge pointer travels. Readings can be made within 1/10 of a division at any part of the scale.

In mechanical and electrical workmanship the Weston Model 45 Portable Ammeters and Voltmeters practically attain perfection.

A full description will be found in Bulletin 501, which will be mailed to you on request.

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21 Weston Ave., Newark, N. J.

New York	St. Louis	Cleveland	Toronto	Berlin
Chicago	Denver	Buffalo	Montreal	Paris
Philadelphia	San Francisco	Cincinnati	Winnipeg	London
Boston	Detroit	Richmond	Vancouver	Petrograd

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owe some of their efficiency to the thought, energy and resourcefulness of manufacturers who supply the means for such achievements.

These men know how important it is for them to keep in touch with the manufacturers.

In the electric railway industry, such men find the easy, certain and thorough way to keep in touch with manufacturers is through the advertising pages of the

Electric Railway Journal

239 West 39th Street New York

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Condensers.
General Electric Co.
Westinghouse Machine Co.

Conduits, Flexible.
Fibre Conduit Co.

Conduits, Underground.
Fibre Conduit Co.
Johns-Manville Co., H. W.

Controller Regulators.
Electric Service Supplies Co.

Controllers or Parts.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Kerschner Co., Inc., W. R.
Westinghouse Elec. & M. Co.

Controlling Systems.
General Electric Co.
Westinghouse Elec. & M. Co.

Converters, Rotary.
General Electric Co.
Westinghouse Elec. & M. Co.

Conveying and Hoisting Machinery.
American Bridge Co.
Green Eng'g Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
Imperial Rubber Co.
International Register Co., The
Long Co., E. G.
Roebling's Sons Co., John A.
Samson Cordage Works.

Cord Connectors and Couplers.
Electric Service Supplies Co.
Samson Cordage Works.
Wood Co., Chas. N.

Cotton Duck.
Boyle & Co., Inc., John

Couplers, Car.
Brill Co., The J. G.
Cincinnati Car Co.
Long Co., E. G.
Van Dorn Coupler Co.
Westinghouse Trac. Brake Co.

Cranes. (See also Hoists.)
Niles-Bement-Pond Co.
Thew Automatic Shovel Co.

Creosoting. (See Wood Preservatives.)

Cross Arms. (See Brackets.)

Crossing Signals. (See Signals, Crossing.)

Crossings, Track. (See Track, Special Work.)

Culverts.
Canton Culvert & Silo Co.

Curtains and Curtain Fixtures.
Brill Co., The J. G.
Electric Service Supplies Co.
Hartshorn Company, Stewart.
Pantasote Co., The.
Railway Supply & Curtain Co.
St. Louis Car Co.

Cushions, Field Coil.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.

Cutting Apparatus, Oxy-Acetylene
Oxweld Acetylene Co.
Searchlight Co., The.

Derailing Devices.
Cleveland Frog & Crossing Co.
U. S. Metal & Mfg. Co.

Despatching Systems.
Northey-Simmen Signal Co., Ltd.
Simmen Auto. Ry. Sig. Co.

Detective Service.
Drummond's Detective Agency
Wisch Service, P. Edward.

Door Operating Devices.
Electric Service Supplies Co.

Doors, Asbestos.
Johns-Manville Co., H. W.

Doors and Door Fixtures.
Brill Co., The J. G.
Electric Service Supplies Co.
Hale & Kilburn Co.

Doors, Folding Vestibule.
Electric Service Supplies Co.

Doors, Steel Rolling.
Kinnear Mfg. Co.

Draft Rigging. (See Couplers, Car.)

Drills, Track.
American Steel & Wire Co.
Electric Service Supplies Co.
Long Co., E. G.

Dryers and Purifiers, Oil. (See Purifiers and Dryers, Oil.)

Dryers, Sand.
Zelnicker Supply Co., W. A.

Engineers, Consulting, Contracting and Operating.
Archbold-Brady Co.
Arnold Co.
Bemis, Anthony J.
Burch, Edw. P.
Byllesby & Co., H. M.
Drum & Co., A. L.
Ford, Bacon & Davis.
Greims Corporation, H. E.
Gulick-Henderson Co.
Hatch, E. G.
Hovey, M. H.
Hunt & Co., Robert W.
Jackson, D. C.,, & Wm. B.
Richey, Albert S.
Roosevelt & Thompson.
Sanderson & Porter.
Scofield Engineering Co.
Stone & Webster Eng. Corp.
White Companies, J. G.
Woodmansee & Davidson, Inc.

Engines, Gas and Oil.
Westinghouse Machine Co.

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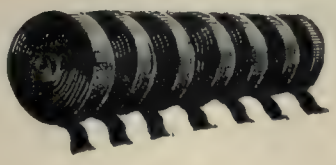

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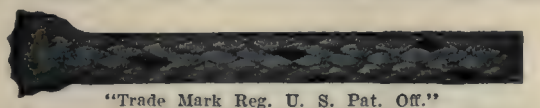

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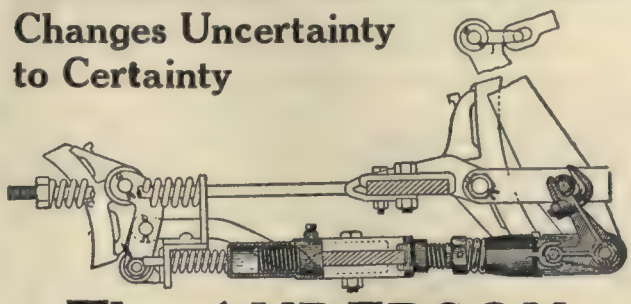

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Wires and Cables.
Aluminum Co. of America.
American Steel & Wire Co.
D & W Fuse Co.
General Electric Co.
Roebling's Sons Co., John A.
Westinghouse Elec. & M. Co.

Wood Preservatives.
Barrett Mfg. Co.
C-A-Wood-Preserver Co.
International Creo. & Con. Co.
Lindsley Brothers Co.
Northeastern Co., The.
Sherwin-Williams Co.
Valentine-Clark Co.

THE CINCINNATI CAR COMPANY

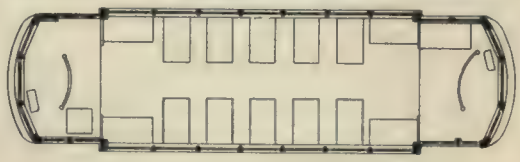
WORKS:

WINTON PLACE
CINCINNATI, OHIO

Niles Car & Mfg. Co.

Niles, Ohio

This car meets all requirements for small cities and non-paying branches of large systems. It can be run with either end forward, requires but one man and is very economical in current consumption for its carrying capacity.



Length, 30 feet 1 inch; width, 8 feet 6 inches; seats, 35 inches; aisle, 24¾ inches; seating capacity, 30.

Underframe is steel, with plate girders to window sills. Floor is steel and Flexolith.

Side walls are of steel, cork and Agasote.

We make all kinds of electric cars.

Van Dorn Radial M. C. B. Coupler—with Pivoting Head

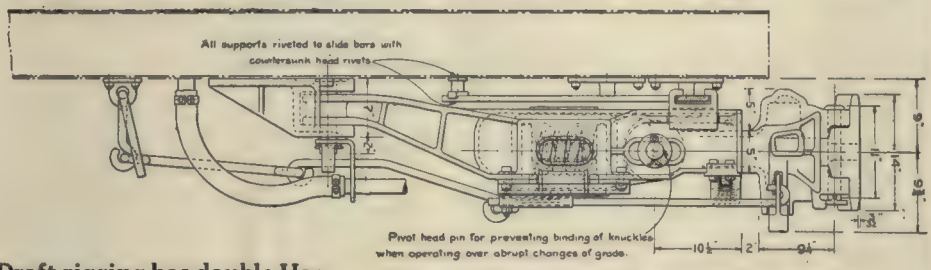
Has extended guard arm and butting wall. Prevents buckling in coupling and in train operation.

Pivoting head (M. C. B. type) prevents binding on severe changes in grade.

Head has deep knuckles which permit wide vertical movement.

Radial carrier eliminates binding even on 30 foot radius curve.

Uncouples from side of car.



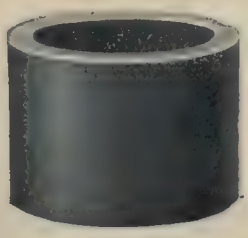
Draft rigging has double Hercules springs which effectively absorb impact shocks. Anchors close to sills give strong anchorage and proper clearance.

Write for blueprints and additional information

Van Dorn Coupler Company
2325 So. Paulina St., Chicago, Ill.

LONGWEAR BUSHINGS

Hardened
Steel
Accurate
Uniform



Dimensions
Exactly
as
You Specify

E.G.Long Company

50 Church Street New York

TULC

IN SIGNALS

The report received from the Division Engineer indicates that the material is satisfactory in the switch and lock movements, switch cylinders, signal cylinders and signal mechanism. Furthermore, the material shows it to be economical in that a small quantity only is needed for lubrication.

THE UNIVERSAL LUBRICATING CO.
Schofield Building CLEVELAND, O.

ALPHABETICAL INDEX TO ADVERTISEMENTS

NOTICE TO ADVERTISERS:

Printing begins on Tuesday of each week.
Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.
New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.
If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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Titanium in Rail Steel

No. 25

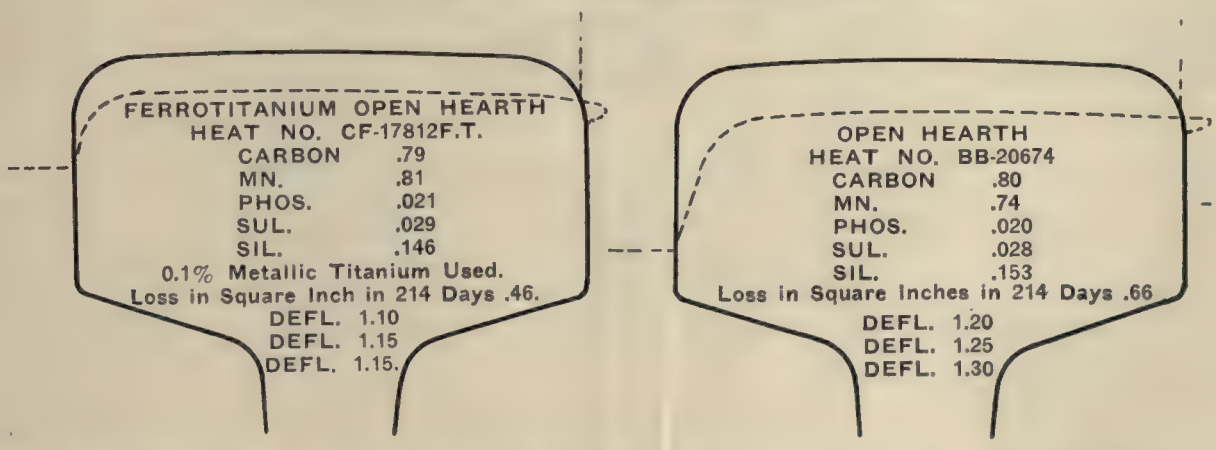
Titanium Treated Rails Wear Longer

The cuts show graphically what happened when Titanium treated rails were tested on the Boston Elevated Railway.

Surface wearing quality is only one of the reasons for the widespread use of Titanium-treated Rail. Titanium treatment greatly reduces segregation of carbon, sulphur and phosphorus. It insures homogeneous, tough, sound rails.

Send for interesting booklets.

Let us tell you how to stop wasting money on your track.



TITANIUM ALLOY MANUFACTURING COMPANY

Operating Under Rossi Patents

Processes and Products Patented

General Office and Works:
Niagara Falls, N. Y.

TPC
Reg. U. S. Pat. Off.
TRADE MARK.

Pittsburgh Office: Oliver Building
Chicago Office: Peoples Gas Building

New York Office: 15 Wall Street

AGENTS:

Great Britain and Europe: T. ROWLANDS & CO., Sheffield, England

Men and Oil

determine lubricating costs.

Galena oils by reason of superior quality will naturally keep lubricating cost at minimum under a given method of use.

But different methods give different results.

So Galena experts coach the men in efficient methods.

And that is why we can stipulate the savings guaranteed under a Galena contract.

Investigate.

Galena-Signal Oil Co.

Electric Railway Department

Franklin, Pa.

3150

LIGHT-WEIGHT STEEL INTERURBAN CARS

AMONG the recent interurban cars built by our companies was a steel framed type for the Cleveland & Eastern Traction Company which is particularly notable on account of its light weight. Its main and smoking compartments have a combined seating capacity of 63, and the length over the vestibules is 54 ft. 6 in.; weight of body and trucks, fully equipped and ready for operation, is 59,400 lb.

The weight is made up as follows: The carbody, 23,186 lb.; heater and miscellaneous equipment, 3,422 lb.; electrical equipment, 2,380 lb.; air brake equipment, 2,812 lb.; pair of Brill 27-MCB2X trucks, 16,120 lb.; four 65 hp. motors and gears, 11,480 lb.

Angle side sills, eleven light I-beam crossings between bolsters, trussed frame end sills, diagonals at each end serving as platform center knees, and pressed steel diaphragm bolsters, compose the powerful bottom frame. Each side of the car, from the sill to the angle top plate, is constructed to form a stiff girder, of which the principal member is a continuous plate rivetted to the sill angle, steel belt rail and the T-posts.

THE J. G. BRILL COMPANY
Philadelphia, Pa.
AMERICAN CAR COMPANY
St. Louis, Mo.
G. C. KUHLMAN CAR CO.
Cleveland, Ohio
WASON MANUFACTURING CO.
Springfield, Mass.
COMPAGNIE J. G. BRILL
Paris, France

BRILL

AGENCIES: PIERSON, ROEDING & CO., San Francisco, Los Angeles, Portland, Seattle. NOYES BROTHERS, Melbourne, Sidney, Dunedin, Brisbane, Perth. DUBBELMAN, 48 Rue du Luxembourg Brussels. SHACKLEFORD & CO., Calle San Martin 201, Buenos Aires. THOMAS BARLOW & SONS, Durban, Natal. SHEWAN, TOMES & CO., Hong Kong, Canton, Shanghai. G. CHECCHETTI, Piazza Sicilia, 1, Milan. LONDON OFFICE, 110 Cannon Street, E.C.

10,000 Kw. Curtis Turbine Metropolitan Street Railway, Kansas City, Mo.

Curtis Turbines for Railway Work

Curtis Turbines are characterized by high economy over a wide range of load.

Curtis Turbines, due to their rugged internal construction, safely withstand the severe demands of rapidly fluctuating loads.

Curtis Turbines are constructed to withstand sudden changes of temperature incident to quick starting, or to variations in superheat while running.

Curtis turbine driven generators are the result of years of experience with all classes of electrical apparatus, and embody those special features essential to turbine requirements.

These features have demonstrated the superiority of the Curtis Turbine for street railway service, particularly where severe grades render the station load subject to considerable variation. The 10,000 Kw. turbine pictured above, the most recent addition to the generating equipment of the Metropolitan Street Railway of Kansas City, is a typical Curtis Turbine operating under these conditions, and satisfying the demand for high economy and uninterrupted service.

General Electric Company

General Office: Schenectady, N.Y.

ADDRESS NEAREST OFFICE

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
Boston, Mass.
Buffalo, N. Y.
Butte, Mont.
Charleston, W. Va.
Charlotte, N. C.
Chattanooga, Tenn.
Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio
Columbus, Ohio
Dayton, Ohio
Denver, Colo.
Des Moines, Iowa
Duluth, Minn.
Elmira, N. Y.
Erie, Pa.
Fort Wayne, Ind.
Hartford, Conn.
Indianapolis, Ind.
Jacksonville, Fla.
Joplin, Mo.
Kansas City, Mo.
Knoxville, Tenn.
Los Angeles, Cal.
Louisville, Ky.
Memphis, Tenn.
Milwaukee, Wis.
Minneapolis, Minn.
Nashville, Tenn.
New Haven, Conn.
New Orleans, La.
New York, N. Y.
Niagara Falls, N. Y.
Omaha, Neb.
Philadelphia, Pa.
Pittsburg, Pa.
Portland, Ore.
Providence, R. I.
Richmond, Va.
Rochester, N. Y.
St. Louis, Mo.
Salt Lake City, Utah
San Francisco, Cal.
Schenectady, N. Y.
Seattle, Wash.
Spokane, Wash.
Springfield, Mass.
Syracuse, N. Y.
Toledo, Ohio
Washington, D. C.
Youngstown, Ohio

For Michigan Business refer to General Electric Company of Michigan, Detroit.
For Texas, Oklahoma and Arizona business refer to Southwest General Electric Company (formerly Hobson Electric Co.), Dallas, El Paso, Houston and Oklahoma City. For Canadian business refer to Canadian General Electric Company, Ltd., Toronto, Ont.

5563

ELECTRIC RAILWAY JOURNAL

Volume 46
Number 3
July 17, 1915

McGraw Publishing Co., Inc.

An Organization Best Equipped to Develop and Conserve the Full value of your Car Advertising Space, because of its Nation-wide scope and Business Connections in the Advertising Field

Barron G. Collier
INCORPORATED
Candler Building
220 W. 42nd. St.
NEW YORK CITY

Truth in Advertising

"Boss," said Joe, the Superintendent, to the General Manager, "did you notice what the advertising men had to say at their recent convention in Chicago about telling the truth in advertisements? I always read advertisements, as I find, with the limited time we have to spare, it is the surest way to keep posted. Take, for example, the Westinghouse advertisements on HL Control and their Standard Motors. They tell the whole story."

"There's no question about it at all," answered the General Manager, "and what is more, everything they ever said about HL Control, or their line of railway motors, has proved to be absolutely correct. When I first read their advertisements about HL Control I doubted the statements made, but the performance has far exceeded the claims made for it."

Westinghouse Electric & Manufacturing Co.

Sales Offices in all
Large American Cities

East Pittsburgh
Pennsylvania

Electric Railway Journal

New York, July 17, 1915

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The flexibility of schedules in meeting traffic changes has been greatly improved. All outside men and service cars are also controlled from the dispatcher's office.

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The Collection of Traffic Data 94

F. W. Doolittle, director bureau of fare research American Electric Railway Association, mentions the items to be included and the method and the frequency of their collection. Preliminary work, length of period of observation and data to be taken in the field. Conclusions to be drawn.

ELECTRIC RAILWAY JOURNAL, July 17, 1915. 15 cols. Ill.

New Haven Operating Results 101

In several written discussions on W. S. Murray's paper on main line electrifications the relative costs of power for steam and for electric operation were exhaustively considered. The discussions are briefly abstracted in this issue.

ELECTRIC RAILWAY JOURNAL, July 17, 1915. 3 cols.

Safety-First Committee Meets 103

Prominent railway officials discuss precautionary measures at first meeting of the transportation committee of the Safety First Federation of America. Darwin P. Kingsley entertains officials at luncheon.

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Railway Motor Commutation and Flashing 105

R. E. Hellmund discusses in detail the problems of the design of direct-current motors from the standpoint of commutation.

ELECTRIC RAILWAY JOURNAL, July 17, 1915. 2⅛ cols.

American Association News 107

H. G. McConnaughy, director of transportation for the convention, announces the appointment of trainmasters for different sections of the country. The program and list of speakers are being compiled. Activity of various association committees.

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Equipment and Its Maintenance 110

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ELECTRIC RAILWAY JOURNAL, July 17, 1915. 16 cols. Ill.

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No back volumes for more than one year, and no back copies for more than three months.

Circulation of this issue 8000 copies.

FRICTION

(Its relation to efficient brake control of moving trains)

FRICTION IS A RETARDING FORCE IN SOCIETY, POLITICS, BUSINESS AND RELIGION.

BUT FRICTION REPRESENTS A CURIOUS PARADOX IN THE VARIOUS FIELDS OF ENGINEERING AND MECHANICS. IT IS AT ONCE ESSENTIAL TO EFFICIENCY AND OPPOSED TO IT. PRACTICALLY ALL APPLICATIONS OF POWER DEPEND FINALLY UPON FRICTION; ALSO ALL POWER APPLICATIONS ARE SUBJECT TO SERIOUS LOSSES DUE TO FRICTION.

A RAILROAD TRAIN IS PECULIAR IN THAT WHILE ACCELERATION—THE HAULING CAPACITY OR TRACTIVE EFFORT OF THE LOCOMOTIVE—DEPENDS FUNDAMENTALLY UPON FRICTION—(WHEEL—RAIL); DECELERATION—BRAKE CONTROL OF ALL TRAIN MOVEMENT—ALSO DEPENDS FUNDAMENTALLY UPON FRICTION (WHEEL—SHOE).

ON THE ONE HAND WE HAVE HEAVY TRAINS AT HIGH SPEEDS REPRESENTING UNBELIEVABLE TOTALS OF FOOT TONS OF ENERGY; ON THE OTHER HAND WE HAVE, TO CONTROL THIS MOVING MASS, THE FRICTION OF A FEW SQUARE INCHES OF BRAKE SHOE IN CONTACT WITH A ROTATING WHEEL.

BRAKE SHOE FRICTION AND TRAIN RETARDATION RESULTING THEREFROM VARY WITH LEVERAGE. PRESSURE, TEMPERATURE, DURATION OF CONTACT, LOCATION OF BRAKE SHOE ON WHEEL, BRAKE MECHANISM DESIGN INVOLVING ABILITY TO ALTERNATE AND GRADUATE BRAKING POWER ON THE TRAIN, AND A HUNDRED OTHER FACTORS WHICH ENTER INTO THIS MOST COMPLEX AND INVOLVED BRANCH OF AIR BRAKE ENGINEERING.

AIR BRAKE ENGINEERING IS MAINLY CONCERNED WITH THE FLEXIBLE, RELIABLE AND EFFECTIVE APPLICATION OF FRICTION TO PROPERLY CONTROL ALL TRAFFIC MOVEMENT BY RAIL.

Suggested by the

Westinghouse Traction Brake Company

Works: Wilmerding, Pennsylvania

PITTSBURGH: Westinghouse Building
CHICAGO: Railway Exchange Building
NEW YORK CITY: City Investing Building
ST. LOUIS: Security Building

Full particulars in Leaflet No. 3823

Westinghouse Electric & Manufacturing Co.

Sales Offices in All Large American Cities

East Pittsburgh Pennsylvania

PUBLISHER'S PAGE

Buy, Boom and Use Advertised Products Because:

2

Advertising is a Symbol of Progressive Methods

The only basis for a permanently profitable advertising campaign in a publication like the Electric Railway Journal is abiding faith in the modern business principle of "Satisfaction First."

Manufacturers who appreciate the lasting profit of satisfied customers make their advertising in the Electric Railway Journal pay.

The very fact, therefore, that a manufacturer is making Journal advertising part of his business activities is a clear indication of a progressive, broad-gauge attitude toward his field.

Naturally, such an attitude is reflected throughout the whole work of designing, manufacturing and selling.

"Satisfaction First" means competent and conscientious work in perfecting the design; it means adequate tests in service before the product is generally offered for sale; it means careful consideration of the customer's needs in selling; it means prompt adjustment of fair complaints.

These practices are the rule among the manufacturers of electric railway materials who advertise in the Electric Railway Journal.

They are further reasons for becoming acquainted and doing business with Journal advertisers, and—

They make the practice of reading advertisements pay.

This is part of a series that discusses the buyers' interests in connection with advertised products under headings outlined in our issue of July 3, page 6.

READ THE SERIES—APPLY IT—

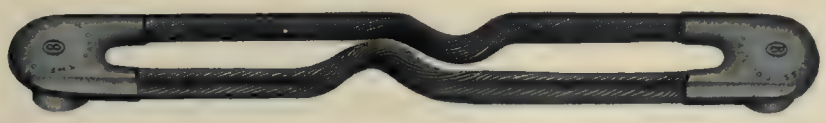
Buy, Boom and Use Advertised Products

The Name on the Box

Indicates the Quality Within

No matter what the style of the Bond, if it bears the O-B trade-mark you can be assured that it is as good as engineering skill and manufacturing experience can make it.

O-B Rail Bonds are made in a big variety of styles to meet all conditions.



Type F Rail Bond with strands flattened to fit under splice bars of light weight rails where clearance is small. Compressed terminal or pin driven.

Let our engineering department aid you in solving your problems. That is a part of O-B service.

THE OHIO BRASS COMPANY
MANSFIELD, OHIO

Applying copper bonds to rails by the oxy-acetylene process

Apply Rail Bonds by Oxy-Acetylene Welding for lasting efficiency and service.

Oxy-Acetylene welded bonds become practically a part of the rail. They "stand up" better than bonds applied by any other process.

Once applied there is no decrease in their electrical conductivity, through years of use.

This positive permanence, ease and speed of installation mean a tremendous saving in your bonding cost.

One man can apply about 120 new bonds per 10-hour day.

PREST-O-LITE

Dissolved Acetylene Makes Oxy-Acetylene Welded Bonds Possible for Every Road

Thousands of Prest-O-Lite welded bonds have been applied to new and existing track. Oxy-Acetylene welding is also without doubt the best method of reapplying bonds originally applied by other means.

Back Your Acetylene Supply by Permanent Service

We make your gas supply easy and certain.

Prest-O-Lite Acetylene Service furnishes the highest grade of Dissolved Acetylene (ready-made carbide gas) in portable cylinders, used as conveniently as you use cylinders of oxygen. Saves the large initial outlay and heavy depreciation, trouble and inconvenience of making crude Acetylene in carbide generators. Besides, Prest-O-Lite Dissolved Acetylene is perfectly dried, cleaned and purified—makes better welds and is cheaper to use.

Enables You to Use Simple, Inexpensive Apparatus

We furnish a thoroughly high-grade welding outfit for $60, not including acetylene cylinders, which are extra and are furnished under a liberal service plan. Truck and special equipment for cutting operations at extra cost.

This apparatus is portable, does not require a train crew for its operations, consumes no current, does not "tie up the line," and can be operated day or night. It is absolutely independent of power house operation.

Materials Easy to Get—Send for Literature on Bonding

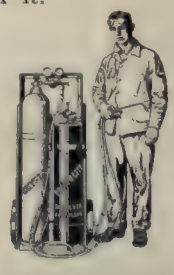
We will be glad to furnish any road with full details of the Prest-O-Lite Service Plan, tell you where suitable bonds can be bought, complete data on comparative bond conductivities, and other interesting information on Oxy-Acetylene Welding in Electric Railway Work. Send for it.

The Prest-O-Lite Co., Inc.

The World's Largest Makers of Dissolved Acetylene

805 Speedway, Indianapolis, Ind.

53 direct factory branches and charging plants in principal industrial centers



The Old Way

The New Way

Finigan Says:

I submit views of our old and new style of protecting single-track lines; view 1 is of the old type of hand-throw signal used, having to entirely depend upon crew to operate Signal, which caused a certain amount of delay and a chance of running past signal.

On our new installation of the United States Automatic Electric Signals we have done away with that certain amount of delay and the chances.

These signals are used to protect about a mile of single track, with a turn-out about half way, over which two different railways operate a line of cars, each road using the turn-out as a meeting-point.

Under old conditions when one line would run late it would naturally delay the other line, but under the present conditions these delays have been done away with.

In December, 1914, 2 sets of the United States Automatic Electric Signals were installed on this line and have been operating successfully up to the present.

Yours respectfully,
Chas. Finigan, Line Foreman

Westchester Electric
Railroad Company

And they will do the same for you. Why don't you ask us about "Signals Without an Appropriation"?

United States Electric Signal Company

West Newton, Massachusetts

Foreign Representatives

Quilliam Brothers, Cleggs Court, Chapel Street, Salford, England

U.S. ELECTRIC SIGNAL CO. WEST NEWTON, MASS.

3165

Make a Good Business Move

BEFORE AUGUST 1

and save 5% at the same time

Practically every electric railway man is looking forward to the coming Convention of the American Electric Railway Associations at San Francisco and the

Electric Railway Journal's Annual Convention Number

To be Issued September 18

(Circulation 9000 Copies)

Practically every manufacturer of electric railway materials knows that it pays to use big advertising space in this number—particularly this year, because the

Advertisements in the Convention Number will take the place of the usual Convention Exhibits

The good business move is the prompt ordering of a double-page spread or, at least, a full-page display in this most important electric railway publication of the year.

The 5% Saving

can be effected by sending your copy and cuts before August 1. The saving comes in the form of a discount to encourage promptness so that we can give every advertiser proper classification and ample time to read the proof of his advertisement.

Send your order today.

Send your copy and cuts promptly.

Save 5% by doing it NOW.

Electric Railway Journal, 239 West 39th St., New York

[Member Audit Bureau of Circulations]

"Phono-Electric" Trolley Wire

for Catenary, Cross-span or Bracket Construction

"PHONO-ELECTRIC" is a trolley wire you can absolutely depend upon. IT'S TOUGH—does not rely on a hardened skin for its strength—it is uniform throughout its cross-section.

Unvarying reliability is what you're looking for in a trolley wire. **More car mileage and longer service life.**

The demand for better cars, better roadbeds and faster schedules is an indirect demand for better overhead wires.

"PHONO-ELECTRIC" saves renewals, and renewals cost money. It will give the longest service life. **IT'S TOUGH.**

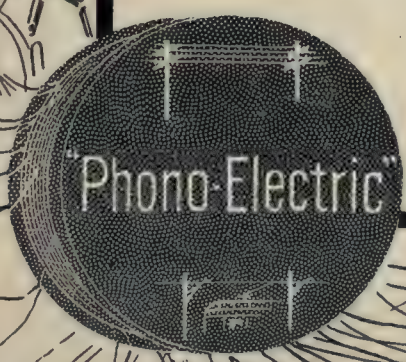
Send for our new Red Booklet.

BRIDGEPORT BRASS COMPANY
BRIDGEPORT CONNECTICUT

North American Copper Company
164 Front Street, New York, U. S. A.

Pierson, Roeding & Company
San Francisco, Portland, Seattle, Los Angeles

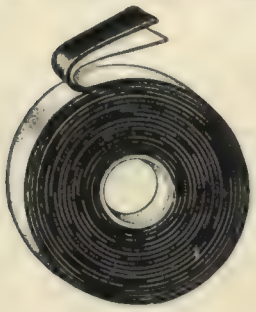
The Equipment & Engineering Company
2 and 3 Norfolk St., Strand, W. C., London, England.



JOHNS-MANVILLE SERVICE
COVERS THE CONTINENT

IF it seems to you like good business to buy products of standing reputation, reinforced by broad gauge dealing and the national co-operation of the seller; if you consider it economical to have materials in your plant that have been bought on a "no risk to you" basis—then you should be using J-M products under the protection of Johns-Manville Service.

J-M Tapes represent the solution of your own problems in insulating wrappings



It takes more than technical knowledge, good materials or equipment to become a factor in Electrical Tape manufacture. True, that all these are necessary, but the most valuable factor is experience. For it is this that gives the tape manufacturer his knowledge on what the field needs.

In catering to the tape requirements of many large users, a complete line has been developed that will cover practically all requirements of manufacture or utility.

Your assurance as to uniform quality and delivery is made positive by our large facilities in manufacture and our buying power in raw materials.

Let us quote you on your needs in friction rubber, asbestos and paper tapes.

The Electrical Department in any branch is at your service.

J-M Niagrite fireproofs cables and protects them against currents, surges and short-circuits

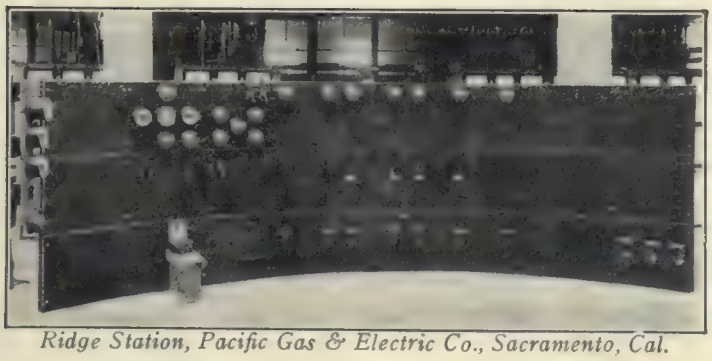
The covering of those parts of cables that are unprotected by ducts or lead sheathing, such as the terminals of cables in tunnels or manholes, on cable rocks and back of switchboards is recognized as important. This is particularly true where large cables and, therefore, heavy currents are handled.

The atmospheric conditions in tunnels and manholes and the necessity of fireproofing cables against heavy current surges or even short circuits, call for a material that must be generally applicable.

J-M Niagrite is such a material. It is a dense felt compound furnished in the form of a listing wrapped on the cable and then impregnated with J-M Fire-and-Water-Proof Cement. The result is a sheath that is as hard as bone, and a fire retardent. We are selling more J-M Niagrite every year to Electric Railways. May we add you to the list of users? Ask nearest branch for particulars.

J-M Niagrite is one of the many textiles we carry. Everything in asbestos sheets, tubings and listings for all purposes.

Instead of Slate for Switchboard, Panel and Distribution Board Mountings use J-M Ebony Asbestos Wood



Ridge Station, Pacific Gas & Electric Co., Sacramento, Cal.

You can still have your "oiled finish Monson" appearance or Black Enameled if you prefer it, so there will be no trouble matching up your panels on switchboard additions. This material is strong mechanically and dielectrically much superior to slate or marble. It can be machined with regular tools.

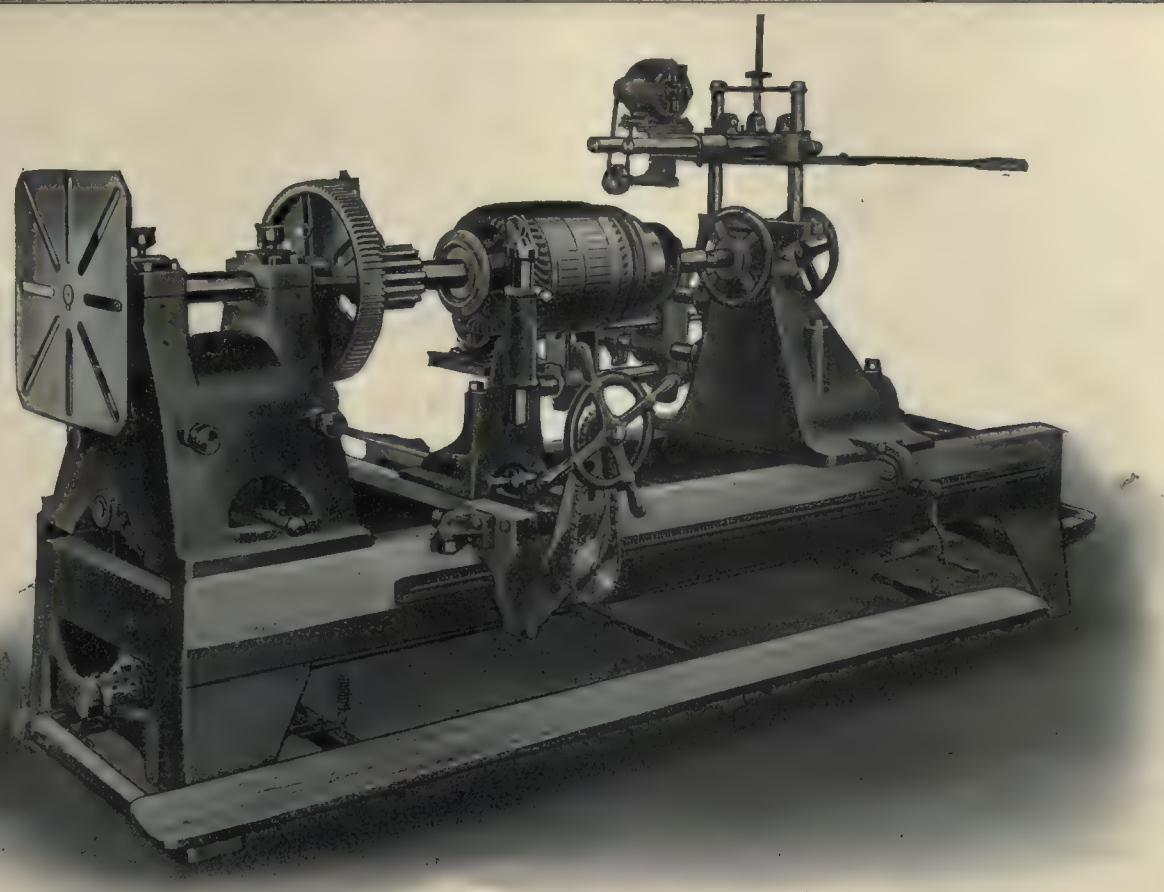
It is obtainable in all thicknesses from ⅛" to 2" and in sheets 36" x 48" and 42" x 96".

All your distribution Board Mountings and linings can be made of this material as well as those little special jobs that you work out for yourself.

H. W. JOHNS-MANVILLE CO.

Akron	Boston	Columbus	Duluth	Kansas City	Minneapolis	Philadelphia	St. Paul	Toledo
Albany	Buffalo	Dallas	Galveston	Los Angeles	Newark	Pittsburgh	Salt Lake City	Washington
Atlanta	Chicago	Dayton	Houghton	Louisville	New Orleans	Portland	San Francisco	Wilkes-Barre
Baltimore	Cincinnati	Denver	Houston	Memphis	New York	Rochester	Seattle	Youngstown
Birmingham	Cleveland	Detroit	Indianapolis	Milwaukee	Omaha	St. Louis	Syracuse	

THE CANADIAN H. W. JOHNS-MANVILLE CO., LTD., Toronto, Winnipeg, Montreal, Vancouver



Peerless Heavy Duty Universal Armature Machine, consisting of a banding machine, commutator slotting and commutator grinding machine and a field coil winding plate.

The Universal Machine for Every Shop

This heavy duty universal armature machine combines four machines made use of continuously in every modern repair shop:

First—A banding machine for handling from the lightest to the heaviest railway motor or locomotive armatures, and having a self-contained tension carriage for band wire.

Second—A commutator slotting machine with independent motor.

Third—A commutator truing or grinding attachment with independent motor.

Fourth—A field and armature coil plate mounted on the main spindle, suitable for all classes of form coil winding.

Think what you could do with this

Peerless Heavy Duty Armature Machine

Think of the great reduction of repair costs that would follow. You could first wind your coils; put them in the slots and solder to commutator bars; band with wire that is maintained *under even and uniform tension;* on a machine which is under perfect control of the operator at all times; on a machine which, when stopping, automatically locks and absolutely prevents slack in the band wire by any back-lash of the armature. And finally, grind and slot your commutator.

An armature completely repaired on the one machine.

The machine is provided with every adjustment; may be arranged for either belt or motor drive; is very heavily built throughout; *is, in truth, "The Universal Machine."*

It will cost you nothing to find out more about it; doing so will place you under no obligation; shall we send this further information?

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Sts.

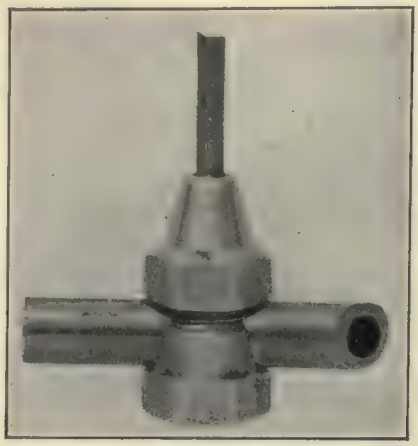
NEW YORK
Hudson Terminal

CHICAGO
417 So. Dearborn St.

EXCELLENCE

SAFETY FIRST MFC SAFETY ALWAYS

RELIABILITY



(BUS BAR TAP) "A" TYPE, CLASS 4000

THE F. M. C. BUS BAR TAP SAVES 20% OF THE CURRENT. IT makes a cold-weld connection. The time saved by elimination of cutting in and out of transformers is also appreciable.
It is made in different sizes, from ¾" Bus Bar to No. 00 Wire.

Engineers are calling for F. M. C. appliances because they can depend upon them under the worse conditions.

F. M. C. CONNECTIONS have been designed to meet the need of all kinds of Electrical and Mechanical connections.

In F. M. C. construction you have a COLD WELD, and a lock. The wire or cable will break outside of the connection before it can move within the connection. It MAKES A POSITIVE CONTACT that will carry the current even if strains should break the cable within the connection. It's always on the job.

Write to us, we can remedy all your connector troubles. The third issue of our catalog and bulletin will be out soon. Write today.

Fargo Mfg. Co., Inc., Poughkeepsie, N. Y.

What you get out of *your* Electric Railway Journal

depends upon the time and thought you put into the reading of it.

Thought, time, energy and money are expended in abundance to make each issue of maximum value to the greatest possible number of readers. You benefit by this expenditure in direct proportion to the attention which you give to your paper.

A mind alert for suggestions will find in every issue food for thought and help in its daily tasks. This applies to the reading of the advertising pages, as well as to the reading of the text.

Remember that electric railway progress is due as much to the efforts of the engineers engaged in developing new equipment for manufacturers as to those who buy and use what these manufacturers tell about in their advertisements.

These engineers who give their talents to the manufacturing branch of the industry are always ready to give the benefit of their study and experience to their fellows in the field. An inquiry addressed to the advertiser is usually all that is required. It will receive prompt attention whether or not you are in the class of potential buyer at the time.

Advertisers know the advantage of giving full and reliable information to everybody in the field who indicates his interest in anything relating to the advertised product.

Make the Most of It

Analyze the Whole Cost of inefficient Trolley Equipment

You know too hard a wheel shortens life of overhead. Poor balance causes constant arcing, destructive to wheel and wire. Oil or grease bearings impede current flow, causing resistance that builds up excessive heat, besides requiring frequent attention for applying lubricant. The car roofing is made unsightly and damaged by dripping oil and shopmen's feet. The pin soon wears loose in the harp—arcing burns out the socket still further—it's ready to scrap.

Cut down all these costs by using the new combination equipment—the

V-K OILLESS TROLLEY WHEEL and NON-ARCING HARP

The V-K OILLESS TROLLEY WHEEL is made of special alloy—tough, but not hard—uniformly well balanced, ensuring perfect contact. Its patented oilless bushing of bronze gauze impregnated with a graphite composition furnishes sufficient and continuous lubrication without any further attention being necessary. Being free from oil or grease this bearing ensures maximum conductivity—will not run hot—is practically indestructible.

The V-K NON-ARCING HARP provides the best form of contact yet devised. The patented V-K gripping device makes contraction of the pin-hole possible, locking the axle pin firmly. It cannot work loose and cause arcing which shortens the life of the harp. The current passes freely through bearing and pin into the harp metal. The contact springs are set so as to act as cushions for the wheel, preventing dewiring from shock. The gripping device is simple, easily worked and allows pins and wheels to be changed quickly at any time.

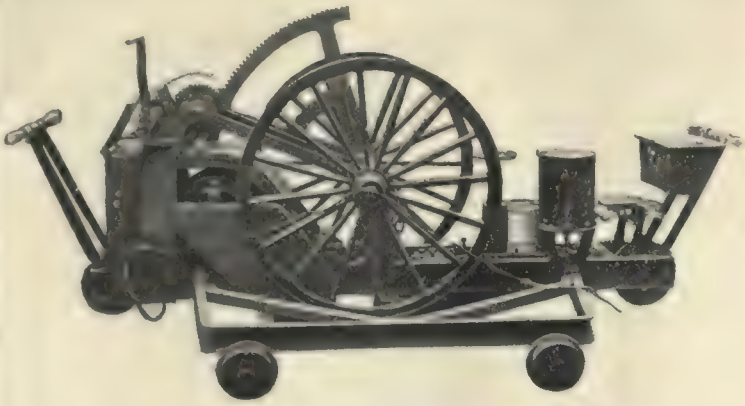
Measure the qualifications of the V-K equipment against what you are using. Any demonstration or test will prove its superiority.

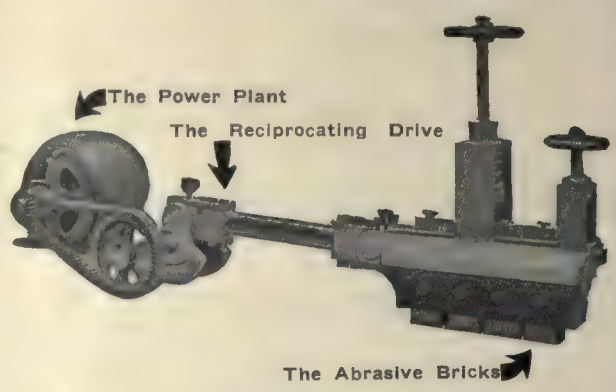
Send for our new illustrated catalog. It contains full information on sizes, styles, etc., covering our whole line of wheels and harps.

More-Jones Brass & Metal Co.

St. Louis, Mo.

Manufacturers of Trolley Wheels and Harps, Contact Springs, Motor Axle Bearings, Armature Bearings, Truck Journal Bearings, Air Compressor Bearings, Armature Babbitt Metal and similar products.





Consider this METHOD

of Saving TRACK

Railway men are practically agreed that track grinding is economical practice.

But grinding is economical only as the means employed is economical.

We would like to submit operating figures to show that the reciprocating method of grinding joints and track is the most *economical* method as well as the most convenient.

Write us for these costs.

Railway Track-Work Co., Heed Building, Philadelphia

When You Pull Loaded Cars—

When every generator in your power house is straining to put sufficient current into the circuit—
Every current leak at rail joints is a tremendous handicap. It makes an undue demand on power generation already at its maximum.

Electric Weld Rail Bonds

cut power losses to a minimum. They do excellent team work by aiding the generators under normal as well as under emergency load.

The Electric Railway Improvement Co.
Cleveland, Ohio

2

Railway Devices of Known Merit

DEVICE No. 1—DIFFERENTIAL STAFFLESS BRAKE
The most powerful and compact hand brake ever manufactured.

DEVICE No. 2—GIANT PERFECTED HAND BRAKE
The well-known "Sterling" device with improved features.

DEVICE No. 3—STERLING TROLLEY BASES
The *original* "Sterling" light-weight, low-level, roller bearing base.

DEVICE No. 4—MULTI-VAPO-GAP LIGHTNING ARRESTERS. (See Illustration)
A compact arrester with visible spark gap. No maintenance due to absence of moving parts.

DEVICE No. 5—THE Q-P TROLLEY CATCHER
A modern device of simplified construction. Practically no maintenance cost. Composed of only *four* parts.

DEVICE No. 6—HYDROGROUNDS—DRIVE AND DISC TYPE. (See Illustration)
Permanent and effective grounds that eliminate all maintenance expense.

DEVICE No. 7—THE "SCREENLESS" AIR STRAINER (Spencer Patents)
Reduces maintenance expense and current consumption of air compressors. Unrestricted air intake always assured.

Drive Type — Disc Type
Hydrogrounds
L. M. Co. Device No. 6

M. V. G. Lightning Arrester
L. M. Co. Device No. 4

Other L. M. Co. Devices
"Sterling" Fenders and Wheelguards
"Sterling" Ticket Punches
"Sterling" Track Sanders
Reversible Trigger Lock Controller Fingers
Controller Handles, Friction and Insulating Tape

Lord Manufacturing Co., 105 W. 40th St. New York

ANNOUNCEMENT

Beginning August 1st

THE ELECTRIC MATERIALS CO.

at

North East, Pa.

will enter into the manufacture of

Electric Machinery
and
Traction Repair Parts

Including Commutators, Trolley Wheels, Line Material, Etc. Copper, Bronze and Brass Castings, Drop Forgings in Copper and Steel.

Fifteen thousand square feet of floor space will be devoted to the production of specialties for the betterment of electric railway operation.

The modern character of the plant insures a low cost of manufacture.

The personnel of the organization comprises first-rank engineering talent.

Correspondence is solicited.

Use G-E Brass Ears for round wire

Check these features:

- ✓ Carefully determined formula of Composition Metal
- ✓ Large bearing flange and reinforcing ribs
- ✓ Accurately machined wire groove

Mean Long Life in Service

- ✓ Prices *right*
- ✓ Shipments from stock

Mean Economy in Buying

Write for sample and prices

General Electric Company

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
Boston, Mass.
Buffalo, N. Y.
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Charleston, W. Va.
Charlotte, N. C.
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Chicago, Ill.
Cincinnati, Ohio
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Erie, Pa.
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General Office: Schenectady, N. Y.

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New Haven, Conn.
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Rochester, N. Y.
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Schenectady, N. Y.
Seattle, Wash.
Spokane, Wash.
Springfield, Mass.
Syracuse, N. Y.
Toledo, Ohio
Washington, D. C.
Youngstown, Ohio

For Michigan business refer to General Electric Company of Michigan, Detroit, Mich.
For Texas, Oklahoma and Arizona business refer to Southwest General Electric Company (formerly Hobson Electric Co.), Dallas, El Paso, Houston and Oklahoma City. For Canadian business refer to Canadian General Electric Company, Ltd., Toronto, Ont.

5623

Electric Railway Journal

Published by the McGraw Publishing Company, Inc.

Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLVI NEW YORK, SATURDAY JULY 17, 1915 No. 3

RETROGRESSION IN RATE MAKING

While we have all proper respect for the theory that administrative bodies should exercise constraint in interpreting "doubtful" provisions of law relating to their own powers, we believe that the Public Service Commission, Second District, New York, has no right so rigidly to interpret its enabling act as to rob it of one of its most progressive and constructive features. In declaring in the Ulster & Delaware Railway mileage case that it must be subservient to the old 2-cent statutory maximum rate fixed before commission regulation began in New York, it has reverted to the practice of inexperienced legislative domination which the commission law endeavored to destroy. The maximum rate was simply an ill-considered guide pending the installation of more scientific methods which the present regulatory machinery was intended to supply. While this should be self-evident, the point is strengthened by the facts that in Michigan the maximum rate law has been declared superseded by the commission law and that in New York since 1907 Governors have vetoed all rate bills as infringements on the powers delegated to the commissions. For a non-expert Legislature to force a commission to exercise discrimination so as to grant unlimited relief to the public and greatly restricted relief to the carriers, is a travesty upon the whole spirit of commission rule. Of course, if the Legislature wishes to resume its rate-making power, it can; but while commissions last, no super-technical nullification should be exercised against their potential usefulness in granting rates which they are convinced are just to carriers.

THE PURPOSE OF COMMISSIONS

We realize that it is not a popular thing for a commission to raise rates and so diminish the privileges which the public has enjoyed for a great many years. We believe, however, that the "unpopularity" which would result from such an action is more imaginary than real. In the first place, the public mind is prepared to accept increases in railroad rates with much more grace than it was a few years ago. There has been so much publicity on the necessity of higher rates that everyone now realizes that the expenses of operation of the railroad companies have increased, just as have the living expenses of individuals. Again, the public has a better recognition of the obligations of the railroad commissioners to grant such increases when they are justified. This view of the situation was well expressed in a recent address by Hon. J. F. McLeod, chairman Public Service Commission of Massachusetts. He said: "Capital honestly and prudently invested under economical and efficient management has a constitutional right to a fair return, and the commission is under legal compulsion to allow such rate as will make that return possible. If an increase in fares is shown to be just and reasonable according to that standard, the commission has no discretion except to allow it." We agree with the sentiment thus expressed. The purpose of the appointment of a commission is to provide an impartial body with opportunities in the way of obtaining testimony on which the merits of the rate case can be judged. The testimony alone, and no outside considerations of popularity or unpopularity, should decide whether the rates are to be increased or decreased in any particular case.

SAFETY FIRST FEDERATION

An effort to correlate and perpetuate the general safety work now being conducted in different cities is the purpose of the Safety First Federation of America. For many years electric railway companies have been working out their problems largely unaided. When safety-first work began the railway companies were possibly surprised but certainly gratified to find that they would have willing associates among the public authorities, representatives of the public schools, chambers of commerce and individual, public-spirited citizens. While in many cities the initiative in the safety-first movement was taken by the local railway companies, it soon became, and properly, a community movement in which all of the interests already mentioned participated. In this form most important work has been accomplished, but there have been two points upon which some fear has been expressed in regard to the future. The first of these has been a question of the maintenance of interest in it. In all volunteer movements, after the first enthusiasm has passed away, there is danger that the interest in it will flag. This feeling was expressed in these columns some months ago under the heading "The Brass Band in the Safety Movement." The question raised was: How long-lived will a movement be which has no definite organization behind it whose sole purpose would be to keep it alive? The other point was in connection with the correlation of the work done in the different cities so as to get the most effective results for the least expenditure of energy and money. This meant a comparison of methods followed wherever safety-first work has been undertaken. These two needs, in brief, it is the aim of the Safety First Federation of America to supply. As with the movement in individual cities, it is not primarily a railway matter or even a corporation matter, and it is well that it is not so, but President Allen of the American Electric Railway Association has accepted the office of chairman of the trans-

portation committee of the federation so that the railway interests will be properly represented. A report of the first meeting of the transportation committee, which occurred this week in New York, will be found on another page of this issue.

THE TELEPHONE IN CITY DISPATCHING

Mr. Strong's article in the issue of May 8 on telephone dispatching at Rochester and the article in this issue on a similar system at San Antonio should help to promote wider use of this most rapid means of communication. If it is a good thing to be able to adjust schedules from day to day it is a better thing to adjust them from hour to hour and even from minute to minute. On the European battlefields of to-day we see millions of men moved about as easily as Napoleon maneuvered his thousands, and in no small measure is this due to the telephone. It is not enough to order a regiment to do a certain thing; it must be possible to change its orders almost instantaneously.

Car operation should be on the same modern plane. The schedule, for example, may designate certain cars as short-liners and others as through. Now, if a car is carrying a large number of passengers who want to go beyond the short-line terminus, literal obedience to the schedule will probably displease some of the passengers, especially in bad weather. Sometimes an inspector is stationed at the short-line terminus to decide whether or not the car shall go on, but with telephone dispatching in practice the crew could get instructions directly from the dispatcher. Contrariwise, a long-line or through car could be converted to a short-liner if it has no through passengers and when the dispatcher knows that the following car will go through in a few minutes.

Most deviations from the schedule, like those due to mass meetings, public concerts and ball games, can be provided for in advance; not so with large movements of people due to fires or other unforeseen events. Not long ago there was a big fire in a large Southern city. Had an effective telephone dispatching system been in use the local railway would not only have rerouted the affected car line more quickly, but would also have collected thousands of fares by running special cars to and from the fire. Instead, the jitneys got the business. The way the San Antonio Company dispatched and rerouted cars in accordance with the progress of a parade shows how readily the telephone permits the remolding of a schedule.

It is hardly necessary to reiterate here the advantages of telephone dispatching as revealed by the detailed practices of Rochester and San Antonio. But the conclusion may be drawn that the telephone offers barely-appreciated opportunities to make the service flexible, thereby securing with one stroke more revenue and greater public satisfaction. The latter result, in fact, is seldom capable of attainment by direct means, but where every car crew, even in the farthest outlying districts, can notify the passengers in advance regarding unexpected operating changes, at least one prolific source of friction is at once removed.

COLLECTING TRAFFIC DATA

The latest article by F. W. Doolittle, director of the bureau of fare research, published elsewhere in this issue, is unusually valuable by virtue of its lucid presentation of the best practice in the work of collecting traffic data. From the experiences of individual railways and engineering companies that have made traffic surveys, Mr. Doolittle has collated basic information for all electric railway operators and has also added carefully-drawn distinctions in regard to the survey plans to be followed by companies of different sizes. Officials who desire for themselves or for their traffic survey staff a readable analysis of traffic survey procedure will find Mr. Doolittle's article replete with concrete suggestions.

In constructing his paper Mr. Doolittle develops his theme logically along the line of the items to be covered by a traffic survey, the frequency of their collection, the preliminary work, and the actual collection and the recording of data. The two points most interesting are in connection with the frequency of collecting data and the extent of the data to be taken. The frequency of traffic studies is impossible of exact determination on account of such factors as size of company, character and growth of territory, traffic density, business conditions and season changes, but sufficient generalization can be made on this topic to say that the time interval between collection dates should be short so that the company will keep pace with traffic fluctuations. The conducting of separate studies for the five ordinary week-days and for Saturdays, Sundays and holidays; the use of twenty-four hours as a minimum period of observation and the making of surveys by preference in the autumn and winter better to estimate peak conditions—these seem also to be becoming definitely formulated principles. It is more difficult to state the extent to which traffic count data should be accumulated, but we believe that Mr. Doolittle has outlined a feasible platform for the average comprehensive survey when he suggests in general the ascertaining of the average number of passengers getting on and off each car at every point during twenty-four hours in the case of the larger companies, the number of passengers getting on and off each car at important traffic points during eighteen hours for companies of medium size and the number of passengers on each car at the point of maximum loading during rush hours for the smaller companies.

It may be that some traffic experts will not agree entirely with this platform. The more one goes into the detail of Mr. Doolittle's article, the greater chance there is of finding particular practices which some experts may not like so much as their own. The science of making traffic surveys is still new to the transportation field as a whole, and through the kindness of local conditions individual initiative has had full sway in its development up to now. But Mr. Doolittle's article is concerned not so much with details as with general principles. Traffic survey principles are gradually becoming clarified and more widely accepted, and he who desires to understand the theory of such work should give the article a careful perusal. The technique to be followed,

however, in applying these principles to specific properties under the varying effect of local conditions and inherent characteristics is a problem to be worked out with all possible standardization by the men who are experienced in the multitudinous details of traffic surveys.

CONTACT SYSTEMS FOR HEAVY TRACTION

Never were there more interesting developments in progress in electric traction than at the present moment and in no place are these developments more interesting than in heavy electric traction. In this field one hears more about locomotives, cars, power plants and transmission lines than about contact systems, but the importance of the contact system was brought out in the railway papers and discussion presented at the A. I. E. E. convention, which were abstracted at length in last week's issue of this paper. While much of the discussion was taken up with routine construction and operation, one can read between the lines and note some very significant facts.

In the first place the phraseology of contact systems needs definition in order that the apparatus and its performance may be accurately and concisely described. The art is changing so rapidly that there is the possibility of adopting names for objects almost off-hand, that the words that are first perhaps thoughtlessly applied will remain. This would be unfortunate. In the early days of electrical development cases of this kind occurred, and expressions then coined have become so closely associated with the industry that it has never been possible entirely to get rid of them. The terms "booster" and "to boost down" are examples. In the present advanced state of the art, however, there is no excuse for the establishment of such barbarisms or their perpetuation.

It is further quite apparent that this is a trying-out period for heavy electric traction contact equipment. Broadly speaking, the system is entirely successful, but in detail there is much that is experimental. Steel contact wires are substituted for copper or phosphor-bronze contact wires, but it is found that they rust; rollers are supplied with wood cores and sleeve bearings, but later the cores are omitted and roller bearings are substituted. At the same time data of cost of operation are being accumulated, and if the operators and manufacturers will make these data fully available there will be ample compensation for the annoyance and expense accompanying the developmental work.

In the third place progress in this instance, as always, brings up new problems or old ones in new guise. Provision for voltage rises in third-rail conductors is one such problem. Readers of this paper have noticed several recent references to the subject. When a current in any circuit is interrupted the collapse of the accompanying magnetic field upon the conductors produces a voltage rise. This is more evident when there is magnetic material in the neighborhood of the circuit, as is the case with a third-rail conductor. Such voltage rises add to the difficulties of design of high-voltage d.c. equipment.

Electrification has not as yet made serious inroads upon the steam railroad field. It will do so in due time. Meanwhile the present experiments with motors, contact systems, drives, etc., will make it possible ultimately to electrify a large system without danger of obsolescence losses like those incurred in the early street railway electrifications.

A REMEDY FOR THE NEWSPAPER YELLOW PERIL

The false public impression created by undeserved criticism from unscrupulous newspapers is difficult and often impossible for public utility companies to correct by mere improvements in service. Experience has shown, however, that the misrepresentation may occasionally be rectified by deflecting the editorial "punch" in another direction.

The president of a public service company in a medium-sized city recently related confidentially the experience of his company, which for a while found itself at the mercy of two local newspapers. One of them bitterly attacked its service, while the other stood up for it, putting it in a position somewhat like that of the ancient mariner when the two specters were dicing for his life. Though many of the attacks were unwarranted the company realized that some of them were justified. It accordingly remedied the defects of service and then, calling the hostile newspaper's attention to the betterments accomplished, requested it to give due publicity to them. The editor of the newspaper, however, frankly replied that retraction of its present propaganda would be impossible, for without such a resourceful means of opposing its local rival's policy life would become a bore to his readers and the circulation list would melt away. This answer was a hard blow to the company, but it presently adopted another plan. Through its influence a citizen's advertising club was formed for the purpose of attracting people and industries to the city. When the new plan was explained to the hostile newspaper, the latter, tickled at the thought of prospective subscribers from a city of increased population, at once discarded its toreador policy and backed the advertising club with enthusiasm. It even claimed to have originated the plan. The officials of the public service company smiled inwardly at this assertion, but were perfectly satisfied to allow the newspaper full credit because the latter's columns now glowed with notices of the special facilities afforded by the city, among which were mentioned an up-to-date street railway and a low-priced lighting system.

Whether newspaper criticism is just or unjust, so long as the criticism is sincere public utility companies may aspire to overcome its effect by adopting more progressive operating methods. If the motive behind the attack, however, is simply the idea that to keep attention attracted to it the paper must always be charging with head down at somebody, practically the only remedy, as in the above case, is to wave a red flag in a different direction.

Telephone Dispatching at San Antonio

The Flexibility of Schedules in Meeting Traffic Changes Has Been Greatly Improved—All Outside Men and Service Cars Are Also Controlled from the Dispatcher's Office

The San Antonio (Tex.) Traction Company has been using, since August, 1914, a telephone dispatching system with connections to forty-two street box dispatching stations. The equipment is of Western Electric manufacture installed and operated under lease by the Southwestern Telegraph & Telephone Company. The system is so arranged that in case of need any Bell telephone may be used.

The dispatcher's board is equipped with two private trunks which join it to the San Antonio public telephone exchange. The board also has connections to the traction company's commercial switchboard. The number of active plugs is now forty-two, with room for sixty. The telephones of all officials of the company are tied in with this board so that the dispatcher can get into touch with them at once.

The primary purpose of the board is, of course, the dispatching of cars, but the use of the telephone gives a much greater flexibility than would otherwise be the case, and certain other uses have developed as by-products.

The cars are dispatched by one man ordinarily, an assistant being employed only for meal relief and during the peak hours. The board is operated for the complete daily transportation period of nineteen hours. To enable two men to work together if necessary the board is divided into two sections.

Character of Schedules

The regular schedule calls for headways varying from five to fifteen minutes, according to the line and the time of day. However, conditions frequently arise which make it desirable to deviate from the regular headways. Practically all runs are of such character that the men report for orders on reaching each end of the run. In this way the dispatcher can give clearance orders to the men at frequent intervals or special orders if necessary.

A typical conversation is as follows: The dispatcher says: "Hello." The motorman then replies, "Car 317, Tobin Hill (the line), Otto (motorman)." The dispatcher then says, "9:15 a. m." (time of day). The motorman repeats "9.15," and the dispatcher closes with "O.K."

Making Changes in Schedules

The usefulness of the telephone in adding to the flexibility of the schedule will be apparent from the following instances:

Following rains it may be desirable to slow down the running time by adding say one minute on a fifteen-minute headway. This is readily accomplished by the time instruction which the dispatcher gives to succeeding cars at any given terminus. To guide each man he gives out the revised round-trip time and headway so that the car man can figure his new time-points accordingly.

Saturday and Sunday night service is left entirely to the dispatcher, through the road inspectors, as to when it is desirable to pull off or add cars on any line. The inspectors merely telephone the load conditions to the dispatcher, who acts accordingly.

The convenience of the telephone for setback operation is illustrated by a condition which arose on the West End line on Thursday, May 13. The street was being paved at one end of the line, and many delays were caused by the use of temporary track and the congestion of foreign vehicles which could use no other place but the track. All cars were made equally late. As the schedule headway was fifteen minutes the cars were set back a half-space, or seven and one-half minutes, at 5:37 p. m. and another half space at 7:22 p. m. Of course, the same result would have been accomplished with one full-space setback at 5:37 or perhaps at 6:07, but this would have caused all cars to drag the line at the period of heaviest riding. Consequently, the half-space setback was used, as described, the second half-space being made when traffic was not so important. On other like occasions the conditions before the first setback have been restored by later advance of the same amounts of time.

The most frequent source of delay is due to the breakdown of foreign vehicles where only one car is affected. In cases of this kind the delayed car is generally allowed to proceed until caught by the car following. When this occurs the car with the least passengers transfers its load (usually to the car ahead) and turns back at the last meeting point. When it is impossible to turn back both cars because of a heavy load on each, the cars are permitted to go to the end of the line, and a special car, designated a "pull-out," is taken out of the car station to fill the gap in town and to the opposite end of the line. It may be added here that all San Antonio lines are routed from one side of the town through the business district to the opposite side of the town. The lines are not necessarily true radii, as they make several bends in their course, especially in the business district.

TELEPHONE DISPATCHING—BOARD IN USE AT SAN ANTONIO, TEX.

Still another schedule feature of telephone dispatching is the conversion of short-line cars into full-run cars when load conditions unexpectedly demand it. As soon as such cars have been ordered to proceed to the end of the line, the dispatcher orders out additional cars to maintain the original headway on the short-line section.

Another field for the telephone is found in the ease of securing additional transfers, tickets or change if the conductor runs short. The conductor telephones his wants to the dispatcher advising when his car will pass

Form T219—11-14 5m

SAN ANTONIO TRACTION COMPANY

DISPATCHER'S ACCIDENT REPORT

Date .....191.... Time.....

Car ..... Line ..... Direction.....

Location .....

Motorman ..... Conductor .....

Nature of Accident .....

No. of Passengers on Car ..... in Vehicle .....

No. Seriously Hurt on Car..... In Vehicle.....

Names of Injured.....

Address .....

	Advised	Time
Claim Agt.		
Dr.		
Ambulance		

Dispatcher.

TELEPHONE ACCIDENT REPORT RECEIVED FROM TRAINMEN

downtown headquarters. The supplies are then delivered by messengers.

TROUBLE REPORTS

The telephone is also used by the trainmen to report not only on car troubles but also on line and track defects. These matters are handled on standard forms which show the disposition made by the dispatcher and by the department concerned.

A still more important form of report, which is reproduced, is that relating to accidents. The almost instantaneous knowledge of accidents thus obtained permits representatives from the executive office to get to the scene of trouble at once. Minor accidents involving only slight damage to property are not reported until the car reaches the terminal.

One interesting feature of the company's accident practice is that the conductor is frequently ordered to remain with the injured person. In the meantime the motorman handles the car alone to the end of the trip, thereby avoiding car blockades and delays to passengers.

One "trouble shooter" and one traffic inspector are always on hand at the main office to take care of contingencies.

REPORTS FROM INSPECTORS

The dispatcher also keeps in regular touch with the road inspectors who must report their whereabouts to him at least once an hour, oftener if possible. The dispatcher from these calls plots squares showing when an inspector reported from a given line. By glancing at the sheet one can readily see whether the inspectors are spending too little or too much of their time on given routes. Of course, the fact that the inspectors report at frequent intervals enables the dispatcher to assign any of them to special service. A typical example of the use of inspectors is afforded by stating the conditions under which they were employed to supervise traffic during the "Battle of Flowers" week in April. In addition to the usual number of inspectors in the downtown district, special men were placed at five important corners where telephones were installed to keep the dispatcher in touch with the location and progress of parades; also to keep the regular inspectors

SAN ANTONIO TRACTION CO.

DISPATCHER'S ORDER SHEET

DATE_____191___

	NAME	CAR NO.	LINE	TIME	TRANSFER NO.	HALF FARES	CHANGE	REMARKS
							05	
							10	
							05	
							25	
							05	
							10	
							25	
							25	

DISPY.

TELEPHONE DISPATCHING—RECORD OF CONDUCTORS' REQUESTS FOR SUPPLIES RUN SHORT

advised of the dispatcher's orders concerning the shifting of routes and the turnbacks made necessary by the parades. This made it possible to keep up continuous service to the very last minute and to resume it as soon as possible.

SERVICE GANGS AND CARS

Contact with the line and track workers in the field is also greatly improved by means of the telephone dispatching system, mainly by requesting trainmen to deliver certain messages to the workers along their route.

Even the sand car is dispatched by telephone, as it can thus be used to the best advantage as reports on track conditions may indicate. The wrecker also reports to the dispatcher for orders immediately after clearing up any job in hand. In general, all service cars and gangs are subject to telephone control.

OTHER BENEFITS

The telephone dispatching system has not only effected the improvements in service noted but has also been of value to the general public in other ways. It has facilitated especially the handling of lost articles. Again, in the case of flooded track, it is now possible to answer inquiries more quickly and more intelligently than before so that patrons will know just how they can best reach their destinations in the absence of regular routing facilities.

The Galesburg (Ill.) Street Railway has opened Highland Park, near that city, to the public. Amusements for children received special attention. The park is equipped with a large dining-room for banquet purposes. At Highland Lake, adjacent to the park, the company has developed attractive swimming pools, chutes and springboards. The Galesburg *Daily Mail* spoke editorially in a very complimentary manner of the public work which the company is doing and urged out-of-town shoppers to plan picnics in this park as a part of their sight-seeing while in Galesburg.

FORM T 218 1-15 5M

SAN ANTONIO TRACTION CO.

TO SUPT. OF TRANSPORTATION

TROUBLES REPORTED ON_____191___

CAR NO.	LOCATION	LINE	TIME	NATURE OF TROUBLE	REPORTED BY	TO WHOM REPORTED	TIME	DELAY	FINAL ACTION

TELEPHONE DISPATCHING—JOINT REPORT BY TRAINMAN AND DISPATCHER ON TELEPHONED TROUBLE

The trainman's section is shown at the left of this blank, the dispatcher's section at the right

The Collection of Traffic Data

The Items to Be Included and the Method and the Frequency of Their Collection—Preliminary Work, Length of Period of Observation and Data to Be Taken in the Field—Conclusions to Be Drawn

BY F. W. DOOLITTLE, DIRECTOR BUREAU OF FARE RESEARCH, AMERICAN ELECTRIC RAILWAY ASSOCIATION

The frequency and the regularity with which traffic studies were made in the past varied considerably. In 1910 information from twenty-four companies indicated that eight made such studies daily, three twice per week, three once or twice per month, two upon complaints, and eight at irregular and indefinite intervals. A report[1] made at that time suggests the following factors which may be said to control the frequency of such studies and the seasons at which they should be made:

1. Size of the property.
2. Character of the territory served.
3. Rapidity of its growth.
4. Density of traffic.
5. Business conditions.
6. Season changes.

The report further points out that in order to secure full advantage of fluctuations in traffic and to anticipate public complaints the interval between such studies should be short. In this connection it is of interest to quote the following two paragraphs:

"*Passenger counts.*—That there should be periodical developments of records of passenger traffic with comparatively short intervals intervening."[1]

"The committee wishes to recommend that all member companies make daily records of passenger business by trains in interurban operation, feeling that such records are necessary statistics, not alone for proper construction of schedules and time-tables, but as well for the purpose of comparison with past results (the 1910 report shows eighteen companies out of fifty-seven making such a comparison) and as essential factors in developing estimates of future operation."[2]

Since traffic conditions vary not only with the seasons of the year, but also with the days of the week,[3] many who have studied the matter believe that it pays to make a separate traffic study for week days, Saturdays and Sundays, since the termination of even a small part of the service and for a short time only may mean the saving of many car-miles. Touching on this matter, C. M. Larson says:[4]

"Such a record is necessary for week days, for Saturdays, and for other seasons of the year when the traffic is not of the same magnitude. There are, of course, variations in traffic due to weather conditions. These can usually be determined by general observations and the necessary steps taken for the required variation in the service."

In a paper presented in March, 1914, before The Milwaukee Electric Railway & Light Company's section of the American Electric Railway Association on "The Purposes of a Street Railway Traffic Survey," E. J. Archambault says:

"The traffic count that is carried on in an extensive manner is generally taken during the late autumn and winter months, because it is then that the peak loading is most pronounced and hardest to handle. Other checks, however, are constantly made at all times of the year. It is obvious that this is necessary since the demand is constantly on the increase as a rule, and also that changes are brought about by local conditions along various lines, which affect the loading of other lines as well."

It is interesting to note in this connection that the 1914 Detroit, as well as the 1910 and 1912 Philadelphia, traffic surveys were all made in the autumn of the respective years. The Detroit survey was made by Barclay Parsons & Klapp.[5] The first Philadelphia survey was made by Ford, Bacon & Davis[6], and the second by the Department of City Transit, Philadelphia, with Ford, Bacon & Davis as consulting engineers. To quote from the latter report:[7]

"The survey extended over a period of five weeks from Oct. 14, 1912, to Nov. 18, 1912, which period was selected as representing most nearly normal traffic conditions in Philadelphia."

Quite naturally the periods of heaviest riding throughout the year, the week, and the day have received the greatest amount of attention, but if the traffic survey is to accomplish for any company all the good that it can, it should indicate plainly the relation existing at all times between the amount of transportation furnished and the amount required.

PRELIMINARY WORK

The extent of data to be collected in a street railway traffic study is variable, depending upon how comprehensively it is desired to analyze the transportation problem. Most recent traffic studies consist of a systematic series of inspections and observations in which an actual passenger count is made and the movements of cars and passengers are recorded by inspectors or field agents stationed at selected pertinent points, or riding on cars, or both. In addition other observations of a somewhat general nature are often made. These will be referred to later. Traffic experts are fairly well agreed as to those points on each line of an electric railway system at which a passenger count should be made, and generally a preliminary survey is made to determine them, although occasionally they can be located by a rather casual inspection.

R. M. Feustel, in his report on the 1913 Winnipeg traffic survey, gives an account[8] of the preliminary work, and other recent studies, such as those in Milwaukee, Cincinnati, Philadelphia, etc., follow similar methods of procedure in laying out the work.

"Inspectors were placed on every car on some lines,

[1] 1910 Proceedings of the Transportation & Traffic Association of the American Electric Railway Association, pp. 256a and 264. (ELECTRIC RAILWAY JOURNAL, Oct. 14, 1910, pp. 822 and 824.)

[2] 1911 Proceedings of the Transportation & Traffic Association of the American Electric Railway Association, p. 506. (ELECTRIC RAILWAY JOURNAL, Oct. 13, 1911, p. 836.)

[3] See article by F. W. Doolittle in ELECTRIC RAILWAY JOURNAL, May 15, 1915, p. 926.

[4] C. M. Larson—"A Street Railway Traffic Survey"—*Municipal Engineering*, February, 1914. (ELECTRIC RAILWAY JOURNAL, Jan. 24, 1914, p. 177.)

[5] Barclay Parsons & Klapp—Report on Detroit Street Railway Traffic and Proposed Subway, January, 1915, p. 57. (ELECTRIC RAILWAY JOURNAL, April 3, 1915, p. 664.)

[6] Ford, Bacon & Davis—Report on Philadelphia Service and Equipment. (ELECTRIC RAILWAY JOURNAL, June 17, 1911, p. 1065.)

[7] A. M. Taylor—"The Solution of a City's Transit Problem"—*Electric Journal*, October, 1914, p. 516. (ELECTRIC RAILWAY JOURNAL, Jan. 10, 1914, pp. 76-79.)

[8] R. M. Feustel—Report on Winnipeg Street Railway Service—Public Utilities Commission of Manitoba, 1913. (ELECTRIC RAILWAY JOURNAL, April 18, 1914, p. 865.)

on every other car on other lines, and on every third car on the larger lines. They were kept on the car during the entire day, from the time the car left the carhouse in the morning until late in the evening. Points were chosen along each line, approximately four blocks apart, and the inspector recorded the number of passengers on the car when passing these points and the time of passing. These data gave an accurate record of loading conditions on the different lines, both as to geographical location and as to the time loading occurred. The observations taken covered at least two representative days of travel on each line, and if these two days checked satisfactorily one against the other the data were considered sufficient. If, however, for any special reason the loading was eccentric, additional observations were taken until a normal record was had. An examination of data taken indicates that the travel throughout the day could be divided into rather characteristic periods. The record plotted shows the average of all the observations taken, and each of the characteristic periods was plotted separately into what might be called 'car-loading' curves. These plainly showed the average load carried by the car for each period over the entire length of line. The points where the total number of passengers on the car was noted included all regular transfer points along the line as well as the other important traffic stops. * * * From the car-loading curves for each line the point of maximum loading was determined. Other points along the line were selected so that in most cases several street observations were taken on each line simultaneously. The inspectors who had become familiar with car loads were then stationed at these points to record cars and passengers."

The following special features were shown by these preliminary observations:

1. Variations of traffic in both directions for the different periods of the day.
2. Territory in which the pick-up of passengers is made.
3. Location of through territory in which comparatively few passengers are discharged or taken on.
4. Location of unloading territory.
5. Duration of time in which the overloading occurs.
6. Effect of certain transfer points on car loading.

The following preliminary observations were made by Ford, Bacon & Davis in their 1910 study on "Philadelphia Service and Equipment":[9]

"1. Preliminary car riding by inspectors from July 12 to Sept. 1, to determine: (*a*) Characteristics of traffic. (*b*) Principal time points.

"2. Preliminary rush-hour street observations between 4 p. m. and 7 p. m. from July 15 to Aug. 26 to determine: (*a*) The number of passengers carried past or away from each important point. (*b*) Regularity of schedule. (*c*) Car loading."

The practice followed by companies making studies with their own forces is generally less complicated than that indicated by the above references. This has resulted from the fact that the former studies have usually been made for the purpose of answering specific questions as to conditions at definite points, while the latter have sought to obtain information concerning all lines and routes on the same basis. A report made in 1910 shows that out of eighteen companies reporting, eleven used points of maximum load for observations. In addition, certain other points along the line were chosen in order to get roughly the general characteristics of the line.[10]

"Similar observations should be made at such other points along the line as may be determined by circumstances. The principal purpose of these latter observations would be to furnish a basis for turning of cars which it is not necessary to operate the entire length of the line."[11]

An extension of the above method to cover every stop along a line may be found in the so-called "boarding and leaving" tabulation method, reported in use by the Boston Elevated Railway and the Public Service Railway Company of New Jersey[12] and used by Barclay Parsons & Klapp in the 1914 Detroit traffic survey.[13] It consists of having the checkers ride on a certain proportion of cars along a line and record the number of passengers getting on or off the car at each stop. This method was also used by Ford, Bacon & Davis in their 1910 Philadelphia traffic study.[14] Observers were on one car in every eight along each line for twenty-four hours and recorded the number of passengers getting on or off the car at each stop, together with the time the car passed. The lines were counted by selected groups, related or adjacent lines being counted together. The count extended from Aug. 29 to Sept. 22, but no observations were taken on Saturdays, Sundays or holidays.

Recent traffic studies, particularly those in Milwaukee, Cincinnati, St. Louis and Winnipeg, have demonstrated that the point of maximum load is approximately the same for traffic in each direction—that is, for in-bound cars in the morning and for out-bound cars in the evening; that these points may be considered to follow roughly a line about the congested section; that between the point at which maximum loading first occurs and the point at which it ends the number of passengers is approximately constant, and that there is a point on every line at which the company is justified in terminating part of its service, since few passengers live near the end of the line and the waste of car-miles in order to make a turn is considerable.

LENGTH OF PERIOD OF OBSERVATION

The period of time to be covered by the count on any line at any point is fairly well agreed upon, considering the variation in local conditions and the divergent points of view of those having traffic studies in charge. A recent paper[15] comments thus:

"Unless special inspection is made for the rush hours only, the point of maximum loading is covered by an inspector at all times of the day from about 6 a. m. to about midnight. Frequently surveys are made which cover the complete twenty-four hours. This is done only where a question arises about the owl service."

Another says:[16]

"The count should cover a long enough period to obtain normal results with twenty-four hours as a minimum."

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[9]Ford, Bacon & Davis—Report on Philadelphia Service and Equipment. ELECTRIC RAILWAY JOURNAL, June 17, 1911, p. 1065.

[10]1910 Proceedings of the Transportation & Traffic Association of the American Electric Railway Association, p. 256a. (ELECTRIC RAILWAY JOURNAL, Oct. 14, 1910, p. 822.)

[11]C. M. Larson—"A Street Railway Traffic Survey"—*Municipal Engineering*, February, 1914. (ELECTRIC RAILWAY JOURNAL, Jan. 24, 1914, p. 177.)

[12]"Recent Practice in Traffic Counts," D. J. McGrath, ELECTRIC RAILWAY JOURNAL, Dec. 26, 1914, p. 1385.

[13]Barclay Parsons & Klapp—Report on Detroit Street Railway Traffic and Proposed Subway—January, 1915, pp. 57 and 148. (ELECTRIC RAILWAY JOURNAL, April 3, 1915, p. 664.)

"The work was divided into two classes:

"1. The continuous riding of lines from one terminus to another, recording the number of passengers loading and unloading at every street corner, the time from point to point, the number of passengers in the cars at various points, transfer conditions and a few other special items peculiar to individual lines.

"2. Additional trips on all lines through the congested district. * * *"

[14]Ford, Bacon & Davis—Report on Philadelphia Service and Equipment—ELECTRIC RAILWAY JOURNAL, June 17, 1911, p. 1065.

[15]"Purposes of a Street Railway Traffic Survey," E. J. Archambault, The Milwaukee Electric Railway & Light Company.

[16]C. M. Larson—"A Street Railway Traffic Survey"—*Municipal Engineering*, February, 1914. (ELECTRIC RAILWAY JOURNAL, Jan. 24, 1914, p. 177.)

Line

At Weather

EAST		NORTH		WEST		SOUTH	
Run Number	Route	Time	Pass.	Run Number	Route	Time	Pass.

Checked by

Remarks

Electric Ry. Journal

COLLECTION OF TRAFFIC DATA—FORM I—NOTEBOOK RULING FOR FIELD DATA USED BY CHICAGO SURFACE LINES

Standard 2-1/2 x 7-5/8

Bound Slip No.

Div.

Day 191

Tallied at

Time	Run	Car	No. of Pass.			Headway	Sign

Name Badge

Address

Electric Ry. Journal

COLLECTION OF TRAFFIC DATA—FORM II—TALLY SLIP USED BY NEW YORK RAILWAYS

The reports of many of the recent traffic studies show that twenty-four hours was the minimum time spent at each point. In some cases observations at a point covered a period of several days. A surface car traffic study in the Chicago business district, made in 1909 by the bureau of engineering of the Department of Public Works,[17] covered a twenty-four-hour period. The same amount of time was then spent in a study of the elevated lines. In their 1910 Philadelphia general traffic survey, Ford, Bacon & Davis[18] used a twenty-four-hour period as a minimum upon any one line. In the Winnipeg survey "from two to four days' counts were taken on each line in order to obtain average results."[19]

When the points of observation and the period over which data are to be taken have been determined, observers are stationed to collect the required data.

Data to Be Taken in Field

There is, as has been indicated, considerable divergence in practice between the items recorded in different surveys. This is due to varying local conditions, both as to the character of traffic and as to the purposes of the study, and to the organization of the traffic survey department. It is the usual, although not universal, practice to record all cars in each direction at all observation points along each line, the data for traffic in the two directions being preferably kept separately on the opposite pages of a notebook. It is standard practice on the Chicago Surface Lines to employ a notebook ruled as shown in Form I. The New York Railways uses "tally slips" (Form II) which are conveniently handled and from which figures for fifteen-minute periods are entered on Form III for report to the superintendent of transportation. The Milwaukee Electric Railway & Light Company uses Forms IV, V and VI for collecting and summarizing its traffic data.

In general the forms furnished to observers provide for taking the following information:

1. Name of line.
2. Point of inspection.
3. Origin, destination and direction of car observed.
4. The car number.
5. The run number.
6. The time of arrival and departure.
7. The number of passengers on car.

[17] ELECTRIC RAILWAY JOURNAL, May 14, 1910, p. 867.

[18] ELECTRIC RAILWAY JOURNAL, June 17, 1911, p. 1065.

[19] R. M. Feustel—Report on Winnipeg Street Railway Service—Manitoba Public Utilities Commission, 1913. (ELECTRIC RAILWAY JOURNAL, April 18, 1914, p. 865.)

Standard 7-15/16 x 10-1/2

NEW YORK RAILWAYS COMPANY

Office of Superintendent of Transportation.

Tally of Cars New York day, 191

Bound at Bound at

Weather Rail Average seating capacity per car

Time	Cars	Seating capacity	Pass.	Excess or shortage of seat capacity per car		Cars required to give seats	Cars	Seating capacity	Pass.	Excess or shortage of seat capacity per car		Cars required to give seats
				Excess	Shortage					Excess	Shortage	

REMARKS

Copy to Gen'l Supt. of Transportation

Copy to Division General Foreman

Superintendent of Transportation *Electric Ry. Journal*

COLLECTION OF TRAFFIC DATA—FORM III—REPORT TO SUPERINTENDENT OF TRANSPORTATION USED BY THE NEW YORK RAILWAYS

TRAFFIC CHECK

Car Number	Time Arriving	Total Passengers	Total every 15 minutes		
			Passengers	Seats	Cars

Date

Line Checked at

Direction From .M. to .M.

Weather Checked by

Electric Ry. Journal

COLLECTION OF TRAFFIC DATA—FORM IV—TRAFFIC CHECK USED BY THE MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY

RECAPITULATION OF TRAFFIC CHECK

Line Date

PERIOD	
From	To
6:00	6:15
6:15	6:30
6:30	6:45
6:45	7:00
11:00	11:15
11:15	11:30
11:30	11:45
11:45	12:00

Electric Ry. Journal

COLLECTION OF TRAFFIC DATA—FORM V—RECAPITULATION OF TRAFFIC CHECK FOR THE MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY

On the last point the practice is not uniform. Some cards require an estimate of the total number of passengers on a car as it passes the observation point. Others specify the number of passengers on the car when arriving and when leaving the observation point. The number getting on and off at each observation point has also been recorded occasionally.

In Cincinnati[20] the following information as to passengers was required:

1. Total passengers on car as it arrives and as it leaves.
2. Number of passengers standing in front and rear vestibules.
3. Number of passengers standing in car body.
4. Number of passengers boarding and leaving car.
5. Group or type of passengers: (*a*) Wealthy or professional; (*b*) middle type and shoppers; (*c*) laboring people.

In determining the number of passengers on a car, practice has shown that close estimation of the number from the street on the basis of seating capacity (known by the inspector for each type of car) by adding for those standing and subtracting for vacant seats is a sufficiently accurate method—95 per cent accuracy being attained by the inspectors as shown by check during the recent traffic survey in Milwaukee by the Railroad Commission of Wisconsin.[21]

In estimating the number of passengers it is cus-

[20] R. W. Harris—Report on Cincinnati Traffic Conditions, 1912. (ELECTRIC RAILWAY JOURNAL, Nov. 2, 1912, p. 956.)

[21] R. M. Feustel—Report on Winnipeg Street Railway Service—Manitoba Public Utilities Commission, 1913. (ELECTRIC RAILWAY JOURNAL, April 18, 1914, p. 865): "Checking was continued . . . rigidly. . . . The car number and the time being taken each was a check on every other, as the car could be traced then from one end of line to the other. This work was then again checked against the car counts (preliminary study) taken from same corner, and a very substantial agreement was had."

R. W. Harris—Report on Cincinnati Traffic Conditions, 1912. (ELECTRIC RAILWAY JOURNAL, Nov. 2, 1912, p. 956): "Experience in collecting data of this character has shown this method (estimating from street) to be most accurate. In order to ascertain the correctness of the information thus collected, checkers were put on cars and an accurate count was made of a number of cars being observed by field inspectors. Considering the entire amount of data, the check indicates, on the whole, that the count on the street is 95 per cent accurate."

Date Weather

Date Weather

Date Weather

The Milwaukee Electric Railway and Light Company

SUMMARY OF TRAFFIC CHECK

Checked by Day Line

Checked by Day Place

Checked by Day Direction

Checked by Day From To

15 Min. Period	Date	Actual Passengers			Actual Seats			Actual Per Cent Load Factor		Allowed Per Cent Load Factor	Actual Seats Necessary	Number of Cars Arriving		Car Demand	Headway
		By days	Average 15 Min.	Average 30 Min.	By days	Average 15 Min.	Average 30 Min.	15 Min.	30 Min.			By days	Avg.		
6:00 to 6:15															
6:15 to 6:30															
6:30 to 6:45															
11:30 to 11:45															
11:45 to 12:00															

Electric Ry. Journal

COLLECTION OF TRAFFIC DATA—FORM VI—SUMMARY OF TRAFFIC CHECK FOR THE MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY

tomary to allow for those voluntarily standing.[22] The proportion to which this preferential standing may extend is well brought out by an investigation by the Wisconsin Railroad Commission covering many thousands of observations[23] and showing that with a full carload as high as 20 per cent of the seating capacity represents standing by preference. The extent of preferential standing varies, of course, with local conditions, among which may be noted type of equipment, rules, class of passengers, time of day, and length of ride.[24] Probably there is a considerable number of smokers who would rather stand if allowed to smoke, and, when there are vacant seats, it is well to consider these.

The number of passengers on a car has been recorded in the past in several ways—either the actual number estimated or, for instance: light, medium, heavy (Wisconsin Railroad Commission); very light, light, full, crowded, overcrowded (1910 committee on construction of schedules and time-tables of the American Street & Interurban Railway Association); or as no load (less than six), comfortable load (eight or less standing), eight to twenty standing, more than twenty standing (St. Louis Public Service Commission), etc.

In addition to recording all of the above described data, the following additional items are usually considered to be of sufficient value to warrant their collection:

1. Weather conditions throughout day.
2. Abnormal occasions such as ball games, etc.
3. General traffic conditions at observation points, both pedestrian and vehicular.[25]

Traffic may be classified as vehicular and pedestrian, and again as: few; considerable but causing no delay; considerable and causing much delay.[26]

The transportation department of the old Metropolitan Street Railway, New York, classified delays to cars of five minutes or more as follows:[27]

1. Blocking by vehicles.
2. Carelessness of employees.
3. Miscellaneous car trouble.
4. Accidents.
5. Plow trouble.
6. Electrical car trouble other than plow trouble.
7. Electrical transmission trouble.
8. Mechanical defects (cars).
9. Faulty track.
10. Fires.
11. Caused by outside lines.
12. Miscellaneous trouble.
13. Due to outside construction.
14. Due to obstruction in slot.

In order that any traffic study may furnish information of the greatest value to the officers of a transportation company, it must determine as far as practicable the causes of the variations in traffic demand. To do this it is necessary to note many items which may at first seem superfluous. It should be borne in mind that while the primary purpose of traffic studies is to permit the making of scientific schedules, there is frequent opportunity to use the information derived from such studies in prognosticating the future, in meeting complaints, and in stimulating traffic at times and places such as will make the increased traffic profitable.

The steps which must be taken in any community to determine the characteristics of the various lines will necessarily vary, but the following suggestions cover the field in a general way and have formed the basis of inspector's reports in various surveys:

1. Divide line into characteristic sections, and discuss each under the heads: (*a*) Class of passengers; (*b*) time of travel; (*c*) probable destination.
2. Locate various origins of passengers along line and obtain destination and probable route (factories, etc.).
3. State transfer points and give idea as to number (in percentage) of passengers leaving car from which transfer is made, transferring to other lines. If cars on more than one route operate over line, make separate estimates of interchange of traffic.
4. Determine attitude of public as regards service given by the particular line (casual conversation).
5. Make a few specific observations (record counts) of movements of passengers (seated to vestibule and vice versa) in the car as it approaches a stop in downtown and outlying districts.
6. How does standing by preference vary with time of day, class of passengers, district, etc.?

The method used in the 1912 Philadelphia traffic survey differed in many respects from all of the preceding and might be of comparative interest, though its ultimate purpose was somewhat different from most of the herein mentioned studies. To quote from the report:[28]

"The present flow of traffic between all sections of the city was determined by a traffic survey made by the following novel and practical method."

A brief summary follows:

1. A program was prepared from schedules in effect on the Philadelphia Rapid Transit Company lines providing for: (*a*) The counting of passengers on about one car in every five (eighteen-hour) cars operated; (*b*) about four lines a day were to be covered.
2. Two experienced conductors (borrowed from the company and properly instructed and aided) were placed on each car: (*a*) The first, stationed at the entrance, properly filled out and presented an identification slip to each passenger with a request to keep same until collected; (*b*) the second, stationed at the exit, collected such slips and noted on them, after inquiry, the passengers' destination.
3. The count slips were printed tickets, somewhat larger than street car transfers, were numbered serially and supplied in pads of 100. Differently colored slips were used for each of four general directions of travel.
4. At end of each half trip all slips collected for it

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[22]Bion J. Arnold—Report on Traffic Situation in San Francisco, 1913 (ELECTRIC RAILWAY JOURNAL, Jan. 11, 1913, p. 63): "Allowance must be made, especially in San Francisco, for the existing fact that many passengers stand by preference even when seats are vacant."

[23]Railroad Commission of Wisconsin, 13—W. R. C. R.—156.

[24]R. W. Harris—Report on Cincinnati Traffic Conditions, 1912 (ELECTRIC RAILWAY JOURNAL, Nov. 2, 1912, p. 956): "The number of preferential standing passengers for any car load is peculiar to the conditions existing in each locality. In Madison, Wis., 21 per cent of any load will stand by preference; in La Crosse, 15.5 per cent; in Lincoln, Neb., 14 per cent; in Milwaukee, 19 per cent, and in Cincinnati, 15.5 per cent."

R. B. Stearns, vice-president and general manager The Milwaukee Electric Railway & Light Company, made the following statement in the summer of 1914: "Since smoking on the cars in the Milwaukee system has been discontinued and pay-within systems of folding doors and closed platforms adopted, a recent recalculation of the number of passengers standing by preference would indicate approximately 5 per cent as compared with 19 per cent a few years ago when smoking was permitted and all the cars were operated with open platforms, front and rear."

[25]Bion J. Arnold—San Francisco Transportation Report on Traffic and Service—December, 1912 (ELECTRIC RAILWAY JOURNAL, Jan. 11, 1913, p. 64): "One very serious cause of the increased difficulties of giving adequate service is the interference of vehicle traffic. . . . A very material improvement, however, has resulted from the institution of traffic regulations in this city (San Francisco) by the traffic squad of the police department, with results that heavy and slow moving vehicles are being gradually encouraged to seek and follow less congested thoroughfares, which has greatly facilitated passenger movement."

[26]R. W. Harris—"A Method for Determining the Adequacy of an Electric Railway System"—Proceedings of American Institute of Electrical Engineers, 1910. (ELECTRIC RAILWAY JOURNAL, July 9, 1910, p. 80.)

[27]ELECTRIC RAILWAY JOURNAL, June 25, 1910, p. 1088.

[28]A. M. Taylor—"The Solution of a City's Transit Problem"—*Electric Journal*, October, 1914, p. 516. (ELECTRIC RAILWAY JOURNAL, Jan. 10, 1914, pp. 76-79.)

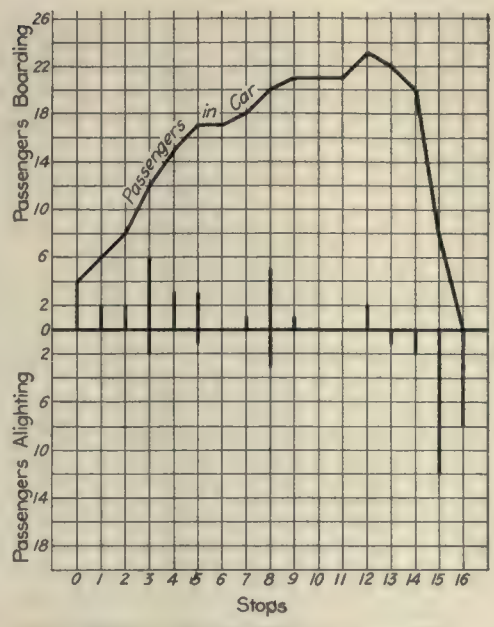
were inclosed in an envelope giving the following information. (*a*) Number of envelope corresponding to the number of half trips counted; (*b*) name of collector; (*c*) date; (*d*) name and number of line being counted; (*e*) direction; (*f*) time of beginning of half trip; (*g*) number of slips inclosed; (*h*) delays; (*i*) unusual traffic movements, and (*j*) other notes.

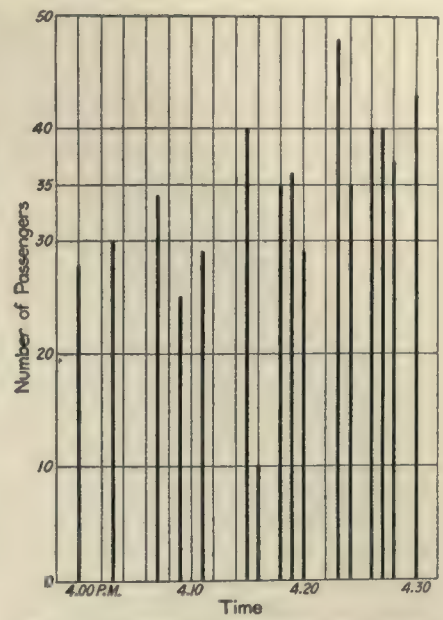
5. The envelopes containing slips were turned in after midnight each day, and were then sent to the Statistical Service Company. Here the information contained on slips was transferred to twenty-four column Hollerith cards, which were then electrically sorted and recorded.

6. No count was made on holidays, Saturdays or Sundays.

7. Checks were made by repeating the count on several lines. These recounts were found to agree in a satisfactory manner with the originals.

8. The data recorded by the Statistical Service Company were returned to the survey office, where they were further analyzed and charted.





COLLECTION OF TRAFFIC DATA—FIGS. 1 AND 2—SHOWING GRAPHICAL PRESENTATION OF BOARDING AND ALIGHTING DATA AND OF TRAFFIC VARIATION THROUGHOUT DAY

RECORDING DATA

"Results are plotted into curves from which it can be readily seen wherein service is defective and recommendations for changes made accordingly."

This comment on the practice of the Board of Supervising Engineers, Chicago Surface Lines, may well serve both as a statement of present general practice and as a recommendation to all engaged in the accumulation of traffic data. Such curves simply represent a summary of observations, but for the great majority of those dealing with such matters the graphic representation of data is far more quickly interpreted than numerical tabulations.

A few typical curves together with the data from which they are drawn will be illustrated. An observer on a car noted passengers boarding and alighting during a run of sixteen blocks, as shown by Table I. Fig. 1 shows this information graphically.[29] Data for, say, fifteen or thirty-minute periods can be combined readily and drawn in the same manner, or from street observations as to number of passengers on the car the car loading line can be drawn.

The variation in traffic throughout the day at any point may be shown by a diagram similar to Fig. 2. Here an inspector stationed at one point throughout the day reports the data shown in Table II. Such a diagram as Fig. 2 serves to indicate whether or not unusual loading is due to distortion of headway, and also, by the use of a line showing seating capacity, points out the relation between excess seats and standing passengers for the particular point on the line.

Of general application and frequent use, the diagram reproduced in Fig. 3 combines several important features. An observer records for each car the number of passengers aboard and the time of passing the point of observation. The seating capacity of cars being known, summaries are made (see Form VI, summary sheet of the Milwaukee Electric Railway & Light Company), and the results plotted as indicated. By plotting on the same figure the seats required by company

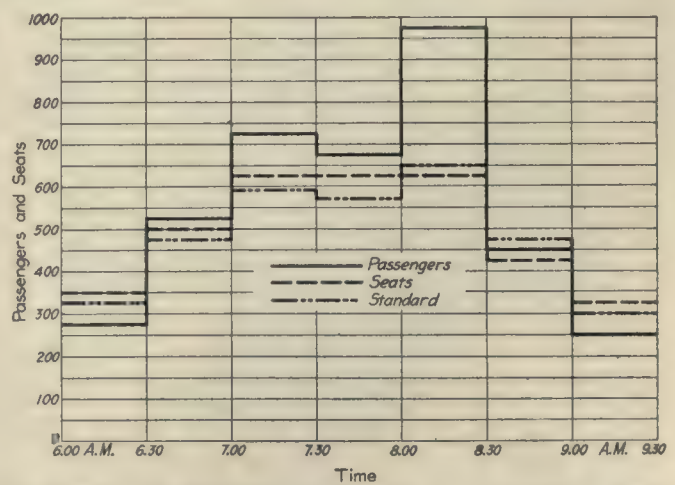
[29]When the stops are laid off on the base line to the scale of their distances apart in miles, the area under this curve represents passenger miles, and divided by the total passengers "on" gives the average length of ride. The maximum ordinate will generally be less than the total "ons." The area between a horizontal line representing seating capacity and that part of the curve lying above the seating capacity line represents "standing passenger miles."

TABLE I—SHOWING DATA NOTED BY OBSERVER AND USED IN FIG. 1
Car No. 100
Passengers

Street	Boarding	Alighting	In Car	Street	Boarding	Alighting	In Car
0	4	..	4	9	1	..	21
1	2	..	6	10	..	..	21
2	2	..	8	11	..	..	21
3	6	2	12	12	2	..	23
4	3	..	15	13	..	1	22
5	3	1	17	14	..	2	20
6	..	..	17	15	..	12	8
7	1	..	18	16	..	8	0
8	5	3	20				

TABLE II—SHOWING DATA FOR TRAFFIC VARIATION AT CERTAIN POINT AS USED IN FIG. 2
Main Street at Twentieth
Southbound

Time	Car Number	Passengers	Time	Car Number	Passengers
4.00 p. m.	1260	24	4.19 p. m.	1247	36
4.03 p. m.	1240	30	4.20 p. m.	1253	29
4.07 p. m.	1229	34	4.23 p. m	1242	48
4.09 p. m.	1262	25	4.24 p. m.	1223	35
4.11 p. m.	1271	29	4.26 p. m.	1218	40
4.15 p. m.	1230	40	4.27 p. m.	1212	40
4.16 p. m.	1231	10	4.28 p. m.	1226	37
4.18 p. m.	1254	35	4.30 p. m.	1261	43



COLLECTION OF TRAFFIC DATA—FIG. 3—GRAPHICAL PRESENTATION OF DATA SHOWING PASSENGERS ABOARD, TIME, SEATING CAPACITY AND STANDARD SEATING REQUIREMENTS

standards, or by franchise standards or those of commissions, the sufficiency of the service can be quickly judged.

Other diagrams than those here illustrated will readily suggest themselves and will permit the setting forth of the tabular data in ways best fitted to the problem under examination.

SUMMARY

It is impossible to indicate other than very general conclusions with regard to the frequency of the collection of data. It may be concluded, however, that this is to an extent automatically determined by conditions already enumerated but that in order to secure full advantage of fluctuations in traffic and to anticipate public complaints, the interval between such studies should be short. Moreover, such studies should be made not only for week days but also for Saturdays and Sundays, and not only for rush periods but for non-rush periods as well. Furthermore, in order to estimate peak conditions accurately, some traffic studies should always be made in the late autumn and winter months.

The type of property will have an important bearing on this question. Following the classification proposed in a previous article in this series, published in the ELECTRIC RAILWAY JOURNAL of June 19, the varying requirements of different companies may be roughly stated as follows:

For the larger companies, all lines should be subjected to a twenty-four-hour study covering week days, Saturdays, Sundays and holidays, and representing also traffic conditions throughout the various seasons of the year. The size of the department which it is necessary to maintain to make these studies will depend upon the frequency with which it is desired to complete the study of all lnes in the system and upon the number of lines it is possible for the department to consider at a time.

For the companies of medium size, a twenty-four-hour general study should be made periodically and eighteen-hour studies on the heaviest lines in rotation.

For the small companies, an eighteen-hour general study, supplemented with special data concerning the points of maximum loading on certain lines during rush hours, will be sufficient.

No definite conclusion can be drawn as to the extent of data to be taken in any traffic study except that the more comprehensive the study made, the greater the value of the information secured. Stated very generally, however, experience indicates the following general procedure:

A preliminary study, covering a number of representative car trips during the different periods of the day and ascertaining the number of passengers at different points along the route, should be made for each line to determine the points of future observation. The points of maximum load and a number of others bringing out the characteristics of the traffic on the line should be used as these points of observation, together with points at which there are cross-overs which may be used for short routing. A car-loading curve, based on the preliminary observations, will help to locate the desired points. The period of time covered by the observations on any one line at any one point should be long enough to give normal results, with twenty-four hours as the minimum.

Inspectors should be stationed at each observation point and should record accurately the following data for every car moving in either direction.

1. Name of line.
2. Point of inspection.
3. Day and date.
4. Weather.
5. Origin, destination and direction of car.
6. Car number.
7. Run number.
8. Time.
9. Number of passengers on car.

The last-named item should be estimated on the basis of seating capacity, by adding for those standing and subtracting for vacant seats (seating capacity of all types being known by inspectors). Allowance should be made for those voluntarily standing, varying from 5 per cent to 20 per cent, according to conditions. In addition to the above data, any other pertinent remarks should be made, such as: ball game, street traffic light, medium, heavy, etc.

A general survey of each line indicating the following should be made:

1. Class of passengers: (*a*) Business and professional; (*b*) middle type and shoppers; (*c*) laboring people.
2. Time of travel.
3. Probable origin and destination (factories, etc.).
4. Transfer points and their effect.
5. Attitude of public as regards service on the particular line.
6. Other pertinent data.

It is possible to reach more definite conclusions concerning the extent of data to be taken and the manner of its determination, by grouping companies in classes as has been previously done in discussing the organization and the frequency of studies. Adopting this plan, the following paragraphs take up the question of method in greater detail.

It is neither necessary nor practicable to study the loading of every car at every point of a trip. It is desirable, however, and the larger companies will obtain this information, to know the average number of passengers getting on and off each car at every point for twenty-four hours of the day and for various days and periods of the year. This information should be obtained by a sampling process—that is, by taking certain cars and certain points at one time and other cars and other points at other times. It will be found that the traffic characteristics of the various car trips will be very nearly alike from day to day, so that it will be possible to combine data concerning one car line taken to-day with that taken concerning another car line to-morrow, provided, of course, no unusual circumstances arise.

For companies of medium size, the number of passengers getting on and off each car at important traffic points previously determined should be noted, and for the smaller companies an estimate should be made of the number of passengers on each car at the point of maximum loading during rush hours.

At the beginning of any traffic study, all the lines should be listed and the general characteristics of the territory they serve should be recorded. The relation of these lines to each other will determine to a certain extent the order in which they will be studied. The general characteristics of the traffic on each line can be determined from conductors' trip reports and from a few rides of inspection prior to the beginning of the collection of specific data.

Each observer should be carefully instructed as to the observations which he is to make and he should be furnished with convenient forms ruled and with printed headings. It is very necessary that every effort should be made to place the observations on a comparable basis, inasmuch as the data from many observers are combined to make the final determination of the sufficiency of service on any line.

In addition to the data concerning the number of passengers on cars at various points, together with the identification of the car by route and time, the observer should record information concerning street traffic, unusual occasions, weather, etc., in order that the extreme variations may be eliminated from the statistical analysis. It is generally advisable also to determine the diversity of loading. For this purpose the passengers in each car passing a given point, for say fifteen-minute periods throughout the day, should be determined and the relation of the maximum to the average should be computed. Certain typical forms for use in collecting and recording this information have been shown.

After these data have been assembled they can be made of greatest value by being represented graphically. There are three general types of curves which it is found helpful to prepare from the traffic data collected. The first is a curve on the horizontal axis of which is laid off the various streets passed in a car trip. Parallel to the vertical axis and above the horizontal axis there is laid off a line proportional in length to the number of passengers boarding the car at each street, and below the horizontal axis, a similar line representing the number of passengers leaving the car at each street. By computing the cumulative difference of passengers on and off, the curve showing the number of people on the car at each street can be drawn.

The second typical curve shows the number of passengers on each car passing a given point and the time at which the car passed the point. The vertical lines representing the number of passengers on the car are drawn at horizontal distances representing the time, and a line connecting the upper extremities of the vertical line represents the loading at any point throughout the period of study. The distance between the lines indicates, of course, the headway of cars and whether or not unusual loadings were due to irregular spacing of cars.

The third general type of curve is one which is plotted for any given point on a line showing, for each fifteen or thirty-minute period during the time under observation, the number of passengers carried by the point, the number of seats furnished and the number of seats which should be furnished in order to conform to the company's rules or to regulations laid down by some controlling body.

Another article will take up the analysis of these curves and their application to the problem of constructing time-tables—which is, of course, the immediate purpose of the traffic survey. There are other ways, however, in which the traffic survey department can be of value to those in charge of the property, and all data should be further analyzed for suggestions as to means of stimulating traffic on such lines and at such times as will make it a profitable addition to the business. There are many questions which the traffic survey department is in a position to investigate and shed light upon, and it should be an able ally of the traffic department.

The United Gas & Electric Company, the Louisville & Southern Indiana Traction Company, and the Louisville & Northern Railway & Light Company, New Albany, Ind., are behind a plan which will provide a monster auditorium in Glenwood Park, the outing park in Indiana, between New Albany and Jeffersonville and across from Louisville. This is a popular picnic ground, a chautauqua ground, camp meeting ground, etc. Incidentally it is signed up for picnics of one kind or another and other attractions for practically all of the summer, and the three railway lines mentioned will get the business.

New Haven Operating Results

In Several Written Discussions on W. S. Murray's Paper on Main Line Electrifications the Relative Costs of Power for Steam and for Electric Operation Were Taken Up

In a paper presented before the Franklin Institute and reported in abstract in the ELECTRIC RAILWAY JOURNAL for Jan. 30, W. S. Murray, consulting engineer New York, New Haven & Hartford Railroad, gave figures covering the cost of construction and operation for the electrified division of the New Haven Railroad and discussed the general principles of successful steam-railroad electrification. Several written discussions of the points brought out by Mr. Murray were presented at the meeting, and these have become available for publication through the Journal of the Franklin Institute, being given in abstract below.

Alfred W. Gibbs, chief mechanical engineer, Pennsylvania Railroad Company, contended that 1 lb. of coal burned under the boiler of a central power plant would not develop twice the drawbar power that the same amount of coal would produce when burned in a locomotive firebox. He cited the record of twenty-seven tests on one locomotive in the testing plant at Altoona. The tests showed that the coal consumption per drawbar horsepower ranged from 2.5 lb. to 5 lb., twelve of the tests showing rates between 2.5 lb. and 3 lb. These are the rates when the locomotive is running, and added to them are certain stand-by losses at terminals. The power station expense, as given by Mr. Murray at 0.69 cent per kilowatt-hour, including fixed charges, taxes and insurance of 0.18 cent, evidently did not include a charge for obsolescence. The fixed overhead charge should be nearly double the figure given, or say, 0.35 cent or 0.4 cent per kilowatt-hour.

George R. Henderson considered that uniformity of traffic is just as important as density of traffic because the peak loads can only be smoothed out when the traffic is uniform, the importance of this being measured by the fact that the power-house and transmission lines cost in the order of $100 per kilowatt. Mr. Henderson considered that the relative fuel consumption for steam and electric locomotives of 50 per cent mentioned by Mr. Murray was due to the comparison with the old type of saturated-steam locomotives. Modern steam engines fitted with super-heaters would change this ratio to, say, 65 per cent.

E. H. McHenry, McHenry & Murray, New Haven, spoke of the growing tendency toward the consolidation of the best features of all of the divergent systems into one system of greatest combined merit. The so-called war of the systems was already nearly at an end.

C. Renshaw, Westinghouse Electric & Manufacturing Company, considered that, owing to ten years' experience in construction and operation, the New Haven electrical plant could be reproduced to-day for not more than 60 per cent of its original cost.

F. E. Wynne, Westinghouse Electric & Manufacturing Company, called attention to the figure of $15,000,000 given as the expenditure for electrifying the New Haven Railroad to date, this indicating that the expenditure has been $120,000 per unit of motor power and $30,000 per mile of single track. Complete electrification of the New York-New Haven division will be accomplished without additional expenditure for trolley construction, and consequently these unit figures eventually will be somewhat changed. The estimated reproduction cost of the installation at 60 per cent of the original cost indicates that the total construction may be made for less than $70,000 per unit of motor power, while the cost per mile of single track will be about $20,000. With

regard to the results secured in connection with energy consumption, these check closely the accuracy of calculations made in connection with the service, thus illustrating the fact that energy consumption with electric operation can be very closely predetermined where trains are operated on a steam railroad basis with definite schedules and definite stops.

Philip Torchio, New York Edison Company, then spoke of the fact that power companies, by averaging the power demand from a great diversity of users, reaped economic advantages in the production of power which the railroad cannot secure under independent generation. The saving in investment in power stations, substations and transmission lines may represent a sensible item in the costs of railroad electrification.

W. A. Del Mar, New York, considered that the results submitted in the paper would have been more valuable if they had been based upon a complete year rather than upon a record for two months only. He asked whether the $15,000,000 expenditures for the installation as mentioned by Mr. Murray included the cost of reducing telephone disturbances and of altering the right-of-way to conform with electrical requirements. Mr. Del Mar was appalled at the development charges amounting to 40 per cent of the entire investment, which were to be inferred from the statement that the present system could be replaced for 60 per cent of the original cost. An interesting feature about the installation had been the development from the complex to the simple and mechanical details, and vice versa in the electrical features. He asked whether the mileages upon which the unit costs were based included yard switching and light locomotive mileage, as these two items might easily amount to 15 per cent of the total. He spoke favorably of results obtained by watt-meters on locomotives.

R. H. Wheeler, Mackenzie, Mann & Company, Ltd., Montreal, stated that a form of electric power which may be standardized for all classes of train service was vitally necessary. He considered that the d.c. motor was especially desirable, but it could be used only in connection with the mercury arc rectifier in case the overhead line was energized with alternating current. This imposed a serious handicap in both weight and control complication. However, by placing the rectifier in the roadside substation and supplying the overhead wire with power at 3000 volts direct current, the desired essentials of transmission economy and standardization of motor-power equipment were obtained. This second standard was offered to emphasize Mr. Murray's definition of the successes arising from a choice of energy which can be standardized.

Closure by Mr. Murray

In closing Mr. Murray stated that the fixed charges mentioned in his paper as 1.8 mills per kilowatt-hour were in error and should be changed to 2.9 mills, the latter figure being based upon an 11 per cent rate on the total investment involved, carrying with it interest, insurance, depreciation and taxes. The total cost, therefore, for energy would become 0.8 cent per kilowatt-hour instead of 0.69 cent, the rate mentioned in the paper.

Realization of the suggestions regarding the uniformity of traffic is, he said, largely accomplished by the electrical movement of freight as well as passenger trains, as the maximum power demand for the former can be made to follow at the time of minimum demand for the latter. By plotting the combined load curve of the New Haven Railroad's passenger, freight and switching services without any rearrangement of the schedules as they are made up to-day, a load factor of 75 per cent is secured. With regard to fuel saving, if the economy of generating units remained fixed it would be fair to grant Mr. Henderson's point that the ratio of coal consumption should be changed from 50 per cent to 65 per cent. On the other hand, the improvement in over-all efficiency of the generating plant is easily keeping pace with that of steam locomotive, and, granting this, there are no other constants or variables which will tend to alter the ratio of 1 to 2 in favor of the fuel economy of electricity versus steam.

With regard to the transfer of steam locomotive power to different divisions of a road where congestion may require it, it was easily conceivable that a division could be electrified with economy without including the financial credit due to the steam locomotive replaced, thus automatically providing steam locomotives for the congested districts and leaving the electrical apparatus to be operated at very high load factor.

The increased reliability of operation with electricity which had been referred to was based upon the engine mileage per failure. A fair average for steam locomotive operation might be cited as 5000 miles per engine failure whereas electrical operation certainly should be as high as 12,000 miles, and in a number of instances on the New Haven it has been as high as 18,000 miles per engine failure. Of course, maintenance and repairs on electric locomotives should be compared to those of steam upon the basis of equal service and weight on drivers.

With regard to the coal consumption cited by Mr. Gibbs as applying to steam locomotives, Mr. Murray emphasized the necessity for considering the stand-by losses in a comparison between steam and electric power, these stand-by losses not being included in Mr. Gibbs' figures for steam locomotive coal consumption.

In answer to Mr. Del Mar's questions, Mr. Murray said that the expenditures made to reduce telephone interference and for altering the right-of-way to conform with electrical requirements were included in the general figure of $15,000,000 for the cost of the entire installation. However, experience has indicated a method of laying out the transmission and distribution systems whereby automatic compensation for telegraph and telephone services can be secured for a very nominal amount. The so-called high development charges appearing in the New Haven installation were in reality due to reductions of cost of material in many cases. In 1907 large high-tension insulators cost $63 each while to-day with three times greater factor of safety the price has been reduced to $7.

With regard to the mileages upon which were based the unit costs given in his paper, Mr. Murray stated that these included both passenger and freight service but did not include yard switching, which is provided for by engines designed especially for that purpose. Light mileage of locomotives was included for the mileages of road engines. The train mileages did not include the mileage of light locomotives, but these had been recorded and were included in the total locomotive mileage, including the total unit cost per locomotive-mile both in freight and passenger service.

The point made by Mr. Del Mar with regard to the negligible error of meter registration on locomotives was interesting, and so far as Mr. Murray had been able to determine the meters on the New Haven locomotives have been accurate and valuable adjuncts in the determination of the general distribution of power.

Employees of the Illinois Traction Company at Champaign, Ill., have perfected a permanent organization for an I. T. S. band, and weekly rehearsals are being held. The company gives the use of a room on the third floor of its new office building at Champaign for this purpose.

Safety-First Committee Meets

Prominent Railway Officials Discuss Precautionary Measures at First Meeting of the Transportation Committee of the Safety First Federation of America

Policies and activities for the ensuing year regarding uniform street traffic regulation were discussed at the first meeting of the transportation committee of the Safety First Federation of America on July 13, at the Federation's headquarters, 6 East Thirty-ninth Street, New York. The meeting was presided over by C. Loomis Allen, president of the American Electric Railway Association and chairman of the transportation committee.

The field of work which has been assigned to the transportation committee covers a wide scope in regard to both steam and electric railway operation, as indicated by the following subjects, which were selected at the organization meeting at Detroit for consideration by the committee:

1. Near-side stop for street cars.
2. Type of cars in regard to entrances and exits.
3. Uniform street regulation governing the operation of jitney buses.
4. Uniform signs and signals at grade crossings (steam and electric lines).
5. Educational campaign outlining the dangers of grade crossings and trespassing on railway property.
6. Suggestions offered by the street traffic committee at the meeting held in Detroit on June 4.

The meeting in New York was attended by several prominent railway executives and operating officials, many of whom have been designated to serve upon the committee by organizations affiliated with the Safety First Federation. In addition thereto, representatives of other organizations concerned in various forms of transportation were in attendance. The following executive officers of the Federation were present either at the business sessions or the luncheon which was later tendered to the committee by President Kingsley: D. P. Kingsley, president of the Federation and of the New York Life Insurance Company; John Gillespie, third vice-president and police commissioner of Detroit; C. L. Bernheimer, treasurer of the Federation and president Safety First Society of New York, and F. H. Elliott, general secretary. The members of the transportation committee present included the following: Chairman, C. Loomis Allen, president American Electric Railway Association, Syracuse, N. Y.; W. E. Cann, assistant to general manager Detroit United Railway, representing the Safety First Society of Greater Detroit; R. W. Meade, president Fifth Avenue Coach Company, representing the Safety First Society of New York City; J. K. Punderford, vice-president and general manager The Connecticut Company, New Haven, Conn., representing the New Haven Chamber of Commerce; J. T. Moffet, superintendent of transportation Washington Railway & Electric Company, Washington, D. C., representing the Washington Safety First Association; F. L. Hubbard, assistant to the general manager Toronto Railways, representing the Ontario Safety League; F. W. Bacon, vice-president Kentucky Traction & Terminal Company, Lexington, Ky.; J. W. Crawford, supervisor of claims Philadelphia Rapid Transit Company, representing the Philadelphia street traffic committee, and H. B. Potter, assistant to the second vice-president Boston Elevated Railway, representing M. C. Brush, who was not able to be present. The members of the committee not in attendance were H. Spoehrer and Richard McCulloch of St. Louis, George Keegan of New York, T. C. Powell of Cincinnati, C. R. Myers of Indianapolis, and E. G. Connette of Buffalo. Among the others present were E. B. Burritt, secretary American Electric Railway Association, and G. A. Walters, secretary to the police commissioner, Detroit.

BUSINESS MEETING

F. H. Elliott, general secretary of the Federation, opened the meeting by presenting a general outline of the present development of the Safety First Federation and the work which it proposes to do in future. The Federation, Mr. Elliott stated, was organized last February. Its membership includes at present all of the safety-first organizations except two in the country, representatives of public service commissions, chambers of commerce in various cities and states, organizations concerned with transportation and various public-spirited citizens. No effort has yet been made to develop a large membership list. The purpose of the new organization is to direct work entirely to problems of public rather than of industrial safety. One of the direct results of the February meeting was the preparation of a safety-first text-book for children. This book, a few preliminary copies of which are now printed, contains rhymes and jingles accompanied by four-color illustrations calculated to impress children with the idea of caution in avoiding the dangers of street cars, automobiles, fire and water. Mr. Elliott spoke of the suggestions which were recommended for general use at the meeting of the street traffic committee in Detroit on June 4-5. These suggestions were mentioned on page 1137 of the ELECTRIC RAILWAY JOURNAL for June 12.

The business of the present meeting, Mr. Elliott stated, was to consider in a preliminary way all transportation matters regarding safety in preparation for the first annual convention of the Safety First Federation of America, to be held at Detroit on Oct. 19, 20 and 21. In commenting on the near-side stop Mr. Elliott alluded to its success in New York as shown by the report of the Public Service Commission for the first six months of its operation. At present there is but one New York newspaper which is agitating against it. Apparently the only difficulty met is that of having to board and alight in winter from the rear ends of cars in an un-snow-swept part of the street. This objection raised the question of whether the position of entrances on cars could be standardized.

C. Loomis Allen stated that standardization of car equipment had received careful consideration by the American Electric Railway Association and standards of certain kinds had already been adopted. While he doubted whether it would be possible to adopt standard cars he maintained that the committee could do many things that make for real safety. It could demonstrate the advantages of the near-side stop by citing its successful use in other cities. It may take time to convince railways and public service commissions of the advantages obtained thereby.

W. E. Cann, assistant to the general manager Detroit (Mich.) United Railway, said that after fifteen months of experience with the near-side stop, he wished to go on record as favoring it. This system has met with almost universal favor in Detroit. The only contention against it was that of having to alight in dirt or

snow. For that matter, however, crosswalks were apt to be as dirty as the rest of the street. Moreover, the increasing use of trailers had removed any advantages which the far-side stop may have had, because with trailers all entrances could not be opposite the crosswalk. Mr. Cann spoke favorably of the use of trailers in Detroit. He considered the jitney movement not a business proposition but the result of the hard times. Nevertheless, its regulation is undoubtedly needed. He believed in the great necessity of an educational campaign on the dangers of grade crossings. During the week-end of Independence Day six people were killed at grade crossings in Detroit. In one of these cases he knew there was absolutely no excuse. No attention whatsoever was paid to the whistle of the train by the driver of the automobile. An educational safety campaign could be largely handled by the local newspapers. Mr. Cann stated that the signals of traffic policemen absolutely govern the cars in Detroit. Fire siren whistles also are held as sacred as a red flag on the railway. He hoped that the use of siren whistles on automobiles could be confined to fire-department vehicles, so that the public would be put on its guard whenever the whistle was heard. He thought that there ought to be signs showing the proximity of fire department stations.

J. W. Crawford, supervisor of claims Philadelphia Rapid Transit Company, described the safety zones used in that city. They are defined by rope barriers, held in uprights.

J. K. Punderford, vice-president and general manager The Connecticut Company, New Haven, Conn., explained that it would be unnecessary, so far as his own railway was concerned, to put through laws enforcing some of the present suggestions for large cities because his property reached only small cities. However, he was decidedly in favor of requiring all teams to show lights at night. A law regulating the encroachment of vehicles on tracks should also be desirable. A written examination for motormen had recently been adopted by his company and he believed it was in the interests of safety. The questions relate to safety in operation. Near-side stops are being made at certain street intersections. The laborers of the company are used to clean off the streets in winter where the near-side stop is used, otherwise the cleaning off probably would not be done. Mr. Punderford thinks that the possibility of standardized car equipment as regards entrances is hardly more than Utopian. A good innovation recently ordered by the Public Service Commission for all electric railways in Connecticut has been the installment of uniform signs where street car tracks emerge from a private to a public highway. These signs are erected diagonally and bear the words "Railway Crossing." He also described an arrangement made by the company with the fire department in New Haven by which the department apparatus, in going to fires, would use certain designated streets. At the intersections of these streets with the railway lines signs are posted and a full stop of the cars is required.

F. W. Bacon, vice-president Kentucky Traction & Terminal Company, Lexington, Ky., described the educational campaign which his railway had conducted in issuing to school children small buttons bearing the words "I stop before I cross the track" and signs for teamsters and merchants to put on their vehicles, "We stop before we cross the track." Mr. Bacon suggested as an additional traffic recommendation the question of regulating slow-moving vehicles on street car tracks. If horse-drawn vehicles could be eliminated from the tracks the movement of traffic could be greatly facilitated and small interruptions prevented. Country people were special offenders in this respect. They were apt to stop their buggies for conversation while on the track. In regard to safety signs his railway has made a special effort to drive home the idea of safety by placarding the whole line with special warning signs at every road and lane intersection and in the near vicinity of livery stables and garages.

H. B. Potter, assistant to the second vice-president Boston (Mass.) Elevated Railway, spoke of the difficulty of adopting standardized traffic rules for irregular streets, as in Boston, which are said to have been laid out from the original cow paths. His company has installed many near-side stops. Each locality, however, has to be considered separately. It would be inexpedient, for example, to install two near-side stops where two streets cross the tracks at close intervals. This innovation should be installed slowly, otherwise the American public, conscious of its inalienable rights, will start an agitation to revert to the old practice. Mr. Potter believed that it would be a good thing if the Federation could bring about standard rules for steam and electric road grade crossings. Better co-operation between the steam and electric roads was needed. Steam railroad men are apt to adopt the big brother attitude toward their electric railway contemporaries.

Mr. Potter thought that safety-first campaigns were very difficult to launch by the railways alone, because the public was apt to suspect ulterior motives. In the recent campaign in Boston the co-operation of the newspapers was obtained. The press announced generous prizes to children who could compose the best poems on "Safety First." This movement was taken up with enthusiasm by many schools. In many cases the teachers had pupils learn the poems. The railway, however, wanted to conduct a wider campaign. Advertisements on safety first were posted conspicuously on inside cars and on billboards. This movement was successful largely because it was supported by the Chamber of Commerce.

Richard W. Meade, president Fifth Avenue Coach Company, New York, said that the jitney bus was a forerunner of a transportation system that was certain to increase in this country in proportion to the improvement in roads and motor vehicle construction. The bus system in London is an example of wonderfully efficient operation. The shops there are a model of mechanical perfection. If bus operation is possible in England it is also possible in the United States. The Federation can be of much assistance in drafting regulations for safety which shall be fair and just to all interests.

At the suggestion of Mr. Allen, two sub-committees were appointed for the purpose of preparing reports for the transportation committee in anticipation of the safety convention in the fall. These sub-committees included a committee on municipal regulation, composed of W. E. Cann, J. T. Moffet, J. W. Crawford and H. B. Potter, and a committee on State and federal regulation composed of J. K. Punderford, R. W. Meade, F. W. Bacon and E. G. Connette.

A luncheon at the Republican Club followed the morning meeting and in the afternoon sessions of the two sub-committees were held. At the luncheon Darwin P. Kingsley, president New York Life Insurance Company and of the Safety First Federation, spoke of the aims of the safety organization. The safety-first movement, Mr. Kingsley said, was the natural outgrowth of the intensive life of to-day. He referred to the large number of fatalities in New York and said that one of the highest aims of the safety-first organization should be to educate the public in the hope of diminishing these accidents. The public was largely to blame for a great many of them and yet was always ready to condemn public utility corporations without awaiting investiga-

tions. The safety-first movement is not purely humanitarian, however, but is a good, sound business proposition. The need of regulating traffic, for instance, was graphically illustrated at the time of the recent police parade in New York City. Soon after the traffic police were withdrawn to parade a condition reigned which approached chaos. The more intensive the life we lead the more necessary is extended government control.

Railway Motor Commutation and Flashing

R. E. Hellmund Discusses the Problems of the Design of Direct-Current Motors from the Standpoint of Commutation

In the current issue of the *Electric Journal* R. E. Hellmund of the Westinghouse Electric & Manufacturing Company has an elaborate article on the causes of flashing and sparking in electric railway motors. Some of the important points are abstracted below.

Improved commutation of itself is of little advantage to a railway company except as it brings with it reduced maintenance cost. Commutator wear is reduced as is evidenced from the fact that the sale of replacement commutators by manufacturers has practically ceased since the introduction of commutating-pole motors. Improved commutation further means reduced wear of carbons and reduced quantities of carbon and carbon dust inside the motor. Such dust accumulations often cause insulation breakdowns. Good commutation further avoids roughening of the commutator which is usually followed by vibration, leading to wear and tear in the brush-holder parts. It also prevents commutator blackening, which leads to the breaking down of the insulation between segments.

The commutating pole has made possible the carrying of heavy overloads on railway motors, permitting higher rates of acceleration and therefore more economical operation, and in some cases making it possible to use two-motor in place of four-motor equipments. It has also made field control possible as well as the design of direct-connected motors for voltages higher than 600, and for use with very small wheels with armature diameters correspondingly small.

Commutating conditions cannot be made altogether ideal for several reasons. Ideal commutation requires a commutating-pole flux changing in proportion to the load, which in turn requires unsaturated magnetic poles. On account of space limitations the iron parts of motors cannot be made as heavy as would be required for this purpose. Further, it is not advisable to design armatures with a large number of small and flimsy teeth and a large number of weak coils, giving numerous chances for insulation breakdown. The preference is for large slots which lead to certain irregularities in commutation. Again, it is not possible to secure the best ratios between armature diameter and length from the commutation standpoint.

Flashing in railway motors is the formation of electric arcs just as in an arc lamp. In the latter the carbons are brought into contact and subsequently drawn apart. After the arc has been established a comparatively small voltage will maintain it. In order to obtain flashing in a railway motor, it is necessary, first, that an arc be established and, second, that this be maintained long enough to cause a flash around the commutator, either extending part of the distance from brush to brush or the entire distance, or a distance around part of the commutator and from thence to ground. Flashing can be prevented by avoiding the formation of the arc and by keeping the voltage between commutator segments so small that an arc cannot be maintained between them. Improving commutation reduces flashing, but even with commutating poles arcs will occur. Brushes may be thrown away from the commutator as a result of a jar, and one of the most successful means for preventing flashing from this cause is the use of a comparatively high pressure on the carbons. In motors having good commutation satisfactory results can be obtained with brush pressures of from 3 to 5 lb. per square inch, although a somewhat increased pressure does not materially increase the losses and wear. This pressure is not always a sufficient safeguard against jumping of brushes. It seems, therefore, in many cases advisable to use pressures in excess of 5 lb. per square inch, a good rule being to apply an initial brush pressure of 5 lb. per square inch, decreasing it slightly if there is no trouble from flashing and increasing it from 6 lb. to 7 lb. per square inch if flashing proves troublesome. It has even been found necessary to raise the pressure as high as 9 lb. per square inch in some cases, but in these the increase in brush and commutator wear was quite noticeable. Jumping of the carbons is the most frequent cause of sparking in commutating-pole motors.

Sparking occurs also in commutating-pole motors under abnormal running conditions, due to the fact that with sudden changes in current the commutating flux does not immediately respond to these changes. Any interruption and re-establishment of power will, in a series motor, always cause temporary arcing and spitting at the brushes.

The above statements explain why the commutating poles have not eliminated the first cause of flashing altogether. Even with the commutating pole it is necessary to design motors so that there is not much voltage between commutator segments. There is, however, a limit to the reduction in the number of commutator bars and the corresponding reduction in the number of turns between bars due to the limit of practicable width of the bar.

Some few commutating-pole motors are more subject to flashing than most of the more popular non-commutating-pole design. The reason for this is that when the limitation in design regarding the allowable voltage between segments in non-commutating-pole motors was removed by the development of the commutating-pole type, some designers were led to bring out motors with strong armatures and weak fields, as well as with many armature turns between segments. These motors were very liable to flash, in fact they would flash-over at high speed at almost every bad rail joint. However, it would not be fair to hold this against the commutating-pole motor. Again, in motors properly designed for flashing a small amount of sparking at the brushes in normal operation does not have any harmful influence upon the flashing. This is especially true of the very small arcs at times observed at the brushes of commutating-pole motors, which produce but a limited amount of vapor and require a large voltage to maintain them. This condition follows from the fact that, as the commutating pole is not a safeguard against the establishment of arcs at the brushes under all circumstances, it is necessary to keep down the voltage which tends to carry the arc over.

Ventilation of motors should have a good effect upon flashing and sparking because the ventilation tends to remove carbon and copper dust from within the motor and to keep the motor dry inside. It further removes hot metal vapors which may exist on account of sparking or incipient flashes.

There are two conditions of operation under which almost any rationally designed motor is liable to flash. First, motors are at times subjected to very high overvoltages, for example, in third-rail installations where, when a heavy load is suddenly taken off the line, voltage

rises up to two or three times the line voltage. It would hardly be possible to design commercial motors which would stand this under any condition of load without flashing over now and then. However, the damage caused to an up-to-date motor by flashing under over-voltage conditions is usually negligible, because the high-voltage surges are usually of very short duration. The damage caused by voltage surges through insulation break-downs may, of course, be quite serious. A second cause of flashing and which often results in serious damage to the motor is the practice of throwing the reverse handle of a four-motor equipment, that is "bucking the motors." With the motor connections established under these conditions it is possible for the motors to pick up as generators under practically short-circuit conditions. The rush of current is so great and the building up of the flux so rapid that the induced voltages are very high, and together with the effect of field distortion nearly always cause a severe flash-over if the motor is running at fairly high speed. The practice of throwing the reverse handle while running should not be tolerated except possibly in order to avoid accidents and damage more serious than the burn-out or break-down of a motor.

Electric Railway Earnings

Analysis by Mr. Doolittle Shows Relative Stability of Earnings from Electric Railway Operation

Continuing the studies of electric railway earnings which were published in the ELECTRIC RAILWAY JOURNAL of Jan. 23, page 183, and of March 13, page 506, F. W. Doolittle, director of the bureau of fare research of the American Electric Railway Association, has compiled the accompanying table to show the results of economic disturbances during 1913 and 1914 upon the several industries mentioned. Eight of the first nine items included therein are derived from electric railway figures.

TABLE SHOWING COMPARATIVE RESULTS OBTAINED IN SEVERAL INDUSTRIES DURING 1913 AND 1914

	1914 in per cent of 1913
1. Electric railways—net earnings—South	104.41
2. Electric railways—gross earnings—South	104.19
3. Electric railways—gross earnings—United States (263 companies)	100.68
4. Electric railways—gross earnings—East	100.58
5. Electric railways—net earnings—East	99.74
6. Electric railways—gross earnings—West	99.69
7. Agriculture—farm crop value—United States	99.60
8. Electric railways—net earnings—United States (263 companies)	99.57
9. Bank clearings—amount—West	97.41
10. Electric railways—net earnings—West	96.79
11. Steam railroads—net earnings—West	94.52
12. Steam railroads—gross earnings—West	94.50
13. Steam railroads—gross earnings—South	93.72
14. Building permits—value—West	93.58
15. Steam railroads—gross earnings—United States	93.46
16. Bank clearings—amount—South	93.29
17. Steam railroads—gross earnings—East	92.31
18. Building permits—value—United States	91.86
19. Building permits—value—East	91.66
20. Steam railroads—net earnings—United States	91.61
21. Bank clearings—amount—United States	90.64
22. Bank clearings—amount—East	89.89
23. Steam railroads—net earnings—East	89.82
24. Steam railroads—net earnings—South	86.17
25. Building permits—value—South	85.76
26. Steel production—tons	75.50
27. Iron production—tons	74.20
28. Cotton crop—value	63.00

The exhibited data argue, of course, not the relative profitableness of the traction industry but its relative stability. No business operating from year to year under constantly increasing costs and furnishing continually more and better service for a fare which is vastly less when measured in terms of the material and labor it goes to purchase than it was twenty years ago, is likely to be very profitable. The fact that it requires the investment of $5 to $7 to produce $1 of gross revenue annually is a further indication that large profits cannot be expected generally. The electric railways of the United States carry ten passengers for every one carried by steam railroads. In cities of 8000 population and over, the average individual rides more than 250 times each year. This use is an integral part of the lives and habits of many millions of people, and it is not strange to find it maintained during periods when other habits are changed. Electric railways are an economic necessity and the service they furnish cannot be accumulated or postponed. The further growth of a city is dependent upon the growth of its transportation facilities. The money for these facilities must be obtained in competition with other industries, and it can be obtained only by the willingness to pay a fair return. The essential stability of the volume of traffic operates, when rates are reasonable, to fix this rate of return below that which must be offered to investors in businesses more speculative in their nature, but unless stability of earnings accompanies stability of traffic, the community loses this advantage which its own habits can create.

West Virginia Association Organized

The Public Service Utilities Association of West Virginia, which includes in its membership electric railways, electric light and power and water works companies, held its first meeting in Charleston on June 15 and 16 and effected permanent organization by the adoption of a constitution and by-laws and the election of permanent officers, as follows: President, Herbert Markle, general manager Appalachian Power Company, Bluefield, W. Va.; first vice-president, G. O. Nagle, general manager Wheeling Traction Company; second vice-president, Mentor Hetzer, general manager Moundsville Water Company; third vice-president, James Imboden, general manager West Virginia Light & Traction Company, Charleston, W. Va.; secretary and treasurer, W. C. Davisson, vice-president West Virginia Water & Electric Company, Charleston, W. Va.; executive committee, W. C. Mathews, president Virginia-Western Power Company, Clifton Forge, Va.; Herbert Markle, G. O. Nagle, Mentor Hetzer, O. B. Welch, vice-president and general manager Williamson Light & Power Company, Williamson, W. Va.; W. L. Foster, general manager Beckley Electric Light & Power Company, Beckley, W. Va.; H. S. Newton, general manager Ohio Valley Electric Company, Huntington, W. Va.; E. W. Alexander, general manager Charleston-Dunbar Traction Company, Charleston, W. Va.; W. A. Maxwell, general manager Logan Heat, Light & Power Company, Logan, W. Va.

The object of the association is to promote the interests of public utility companies in the State along educational and political lines.

Lectures to Employees

Periodical lectures to employees on proper relations with the public have been found to be very helpful in reducing complaints to a minimum on the lines of the Twin City Rapid Transit Company, Minneapolis, Minn. A. W. Warnock, general passenger agent and manager of the publicity department, visits each of the company's six carhouses every three weeks and delivers a fifteen minutes' talk to the extra trainmen and as many of the old employees as can attend. Usually the subject discussed relates to public complaints received during the period between the lectures. The cause of the complaint, its disposition and methods of preventing similar complaints in the future are discussed. Complaints afford a new subject for each lecture, and often being of a personal nature, are more interesting than would be a general discussion.

ANNUAL CONVENTION SAN FRANCISCO OCTOBER 4 to 8, 1915

American Association News

ANNUAL CONVENTION SAN FRANCISCO OCTOBER 4 TO 8, 1915

H. G. McConnaughy, Director of Transportation for the Convention, Announces the Appointment of Trainmasters for Different Sections of the Country—Program and List of Speakers for Convention Being Compiled—Activity of Various Association Committees

TRANSPORTATION ARRANGEMENTS FOR THE CONVENTION

H. G. McConnaughy, director of transportation for the convention, has announced the appointment of J. C. McQuiston, manager Westinghouse department of publicity, East Pittsburgh, Pa., as trainmaster of the Blue Special train; Frank H. Gale, advertising manager General Electric Company, Schenectady, N. Y., as trainmaster of the Red Special train, and L. E. Gould, Western manager ELECTRIC RAILWAY JOURNAL, Chicago, as trainmaster of the White Special train. The Red Special train will leave New York about Sept. 23 by way of the New York Central & Hudson River Railroad, thence to Chicago, and thence to St. Paul and Minneapolis over the Great Northern to Glacier Park, Spokane, Seattle, Portland and San Francisco. The Blue Special train will leave a day or two later over the Pennsylvania Railroad by way of Pittsburgh, Indianapolis, St. Louis, Kansas City and Denver, then through the Royal Gorge to Salt Lake City, Ogden and Lake Tahoe to San Francisco.

After the convention the Blue Special will follow the Red Special, visiting the Yosemite Park, Los Angeles, San Diego and Grand Canyon, then via Kansas City and St. Louis to New York. The White Special will be an especially fast train which will make the run for the convenience of those who cannot participate in the earlier tours. It will be a going trip only and will start from Chicago.

Western members who desire to make reservation on the White Special should do so through L. E. Gould, ELECTRIC RAILWAY JOURNAL, 1570 Old Colony Building, Chicago. Reservations for either of the other trains or reservations from Eastern members who wish to take the White Special from Chicago, and requests for information connected with the tours should be made through H. G. McConnaughy, director of transportation, Room 1002, 165 Broadway, New York City, except that members in New England can make reservations through H. E. Reynolds, chairman transportation committee for the New England territory, Bay State Street Railway, Boston, Mass.

The printed itineraries covering all special trains are now on the press and will be ready for mailing within the next week. The delay in getting these out has been caused by changes suggested by the Railway Association and the necessity of rearranging some of the details in connection with the tours. Every detail covering all tours has been carefully worked out, and arrangements at all points covering hotels, side trips as planned and shown in the itineraries have been completed. The ladies and children accompanying each party will have special care and attention. A maid, who will be at their service at all times, will accompany each train.

The requests received by the transportation committee for the different tours have been so heavy that it will be absolutely necessary for the members to make their reservations as soon after the receipt of itineraries as possible, as the number of people who can be accommodated on each special train is limited. Consequently, all assignments will be made in the order in which requests are received.

SPEAKERS AT THE SAN FRANCISCO CONVENTION

The office of the secretary of the American Electric Railway Association is busily engaged in completing the program for the convention in October. A feature will be addresses by a number of distinguished men. These will be in addition to the regular program of reports and papers upon matters of technical interest to the industry. The list of addresses is not completed yet, but a sufficient number of definite promises have been secured to mark the convention this year as an important one in the annals of the association. Several of these special features were announced by Secretary Burritt this week.

The address of welcome will be given by Hiram W. Johnson, Governor of California.

Ex-senator Jonathan Bourne, Jr., will speak on government ownership, a subject which his years of experience in the business of government at Washington peculiarly qualify him to discuss. While United States Senator from Oregon, Mr. Bourne, besides being the author of the parcel post law, was one of the most efficient forces in the national movement for the construction of good roads, and in other matters of countrywide importance. He is one of the most brilliant and forceful writers and speakers in America.

Another address of great interest at the present time will be on "The Fundamental Principles of the Valuation of Electric Railways" by Bion J. Arnold. Besides the office of chief engineer and chairman of the Board of Supervising Engineers, Chicago Traction, which Mr. Arnold has occupied since its establishment under the ordinance of 1907, Mr. Arnold has been consulting engineer of the Public Service Commission, New York City, on matters connected with subway and street railway properties; consulting engineer Detroit United Railway, consulting engineer for the cities of Pittsburgh, Providence, Los Angeles, San Francisco, Toronto, Cincinnati and Kansas City, Mo., member of the electric traction commission of the New York Central Railroad and president of the A. I. E. E. and has held other important offices.

Jesse W. Lillienthal, president of the United Railroads of San Francisco, will speak on "Welfare Work," a subject to which he has given a great deal of attention both before and since his election in 1913 as chief executive officer of the electric railway system in San Francisco. For fifteen years prior to his going to California he was one of New York City's most distinguished lawyers, and has occupied a place no less eminent at the San Francisco bar, of whose association he is the senior vice-president. He is also a director in many of the corporations that have played an important part in the industrial upbuilding of the Pacific Coast.

A fourth address will be given by Ivy L. Lee, recently executive assistant Pennsylvania Railroad and now a member of the personal staff of John D. Rockefeller. A number of Mr. Lee's addresses on different phases of the subject have appeared in previous issues of this paper, and he was the author of an article on "Principles Underlying Publicity" in the issue of Oct. 10, 1914. He will speak in San Francisco on "Putting Publicity Theories into Practice."

TRANSPORTATION STANDARDS

The new committee on standards of the American Electric Railway Transportation & Traffic Association met on July 14-15 and organized. There were present L. H. Palmer, chairman, C. V. Wood, Alexander Jackson and J. N. Shannahan. The committee formulated rules of procedure for the adoption of standards by the Transportation & Traffic Association, this being intended for submission before the 1915 convention. The form of procedure follows very closely, in so far as it is applicable, that of the Engineering Association. Provision is made in it only for two grades, (1) standards, and (2) recommended methods and practices, the former to include such recommendations of the association as bear its formal approval as standard. The latter grade will include all other definitely approved recommendations. The committee also drew up a syllabus covering the existing standards of the association, and it is expected that this will be issued in the early part of next year.

STANDARD STYLE FOR SPECIFICATIONS

A subcommittee of the committee on standards of the American Electric Railway Engineering Association, consisting of A. S. Richey, chairman, J. H. Hanna and S. H. Spalding, representing E. R. Hill, met last week and drafted tentative regulations to govern the style of specifications adopted by the association. These proposed regulations are intended for submission to the committee on standards at its meeting during the latter part of the month, and if approved at that time they will be presented before the association at the 1915 convention.

COMMITTEE ON BUILDINGS AND STRUCTURES MEETS

A meeting of the Engineering Association committee on buildings and structures was held in New York on July 7 with the following in attendance: C. S. Bedwell, Newark, N. J., chairman; H. G. Salisbury, Toronto, Ont.; R. C. Bird, New York, N. Y.; J. H. Frank, Philadelphia, Pa.; William Roberts, Akron, Ohio, and H. G. Throop, Syracuse, N. Y. A proposed form of contract for general construction work was revised and approved by the committee and will go to the committee on standards for approval as recommended practice. The general specification stands practically as it was except that the agreement portion has been greatly shortened and specific clauses have been added to cover the owner in matters relating to protection against mechanics' liens and actions for damages under the workmen's compensation law.

The sub-committee on the proper provision for expansion and contraction in concrete structures, together with provision for waterproofing joints, presented an illustrated report giving engineering data on the subject and suggested provisions as covered by the assignment. The report was approved for presentation to the association for discussion, with the expectation that the work would be continued.

The sub-committee on fire protection rules reported itself as being in accord with the National Board of Fire Underwriters in regard to the rules on the use of soldering and other heating equipment. The committee presented extracts from the Underwriters' building code as they apply to construction employed in electric railway buildings, with the idea of bringing out discussion on the recommendations.

A new sub-committee on the construction and design of substations submitted a report which the general committee recommended for presentation to the association along with the rules for standard construction prepared by the Board of Fire Underwriters. The committee will submit a plan showing an ideal substation of specified size and also rules and recommendations for details of fireproof construction.

BUREAU OF STANDARDS FOR INTERURBAN RAILWAYS

Ways and means by which a new bureau of standards may be established among interurban railways which are members of the American Electric Railway Association was the purpose of a conference held at Fort Wayne, Ind., the session being attended by James J. Brennan, Fort Wayne & Northern Indiana Traction Company; A. A. Schlessinger, Terre Haute, Indianapolis & Eastern Traction Company; J. A. Kelsey, Union Traction Company of Indiana; M. J. Kehoe, Ohio Electric Railway, and E. J. Burdick, Detroit United Railway. These men were representatives of the Central Electric Railway Association and they form a committee to confer with a committee from the American Electric Railway Association to ask the latter body to adopt a standard of operating interurban trains on the lines of the members of the C. E. R. A. which will be uniform.

Meeting of Canadian Electric Railway Association

The annual meeting of the Canadian Electric Railway Association was held at the Chateau Frontenac in Quebec on June 21 and 22. After the opening address by President C. B. King, manager London Street Railway, Secretary-Treasurer Acton Burrows, managing director *Canadian Railway and Marine World*, gave a detailed report covering the association's activities during the year and a wide variety of other topics. W. F. Graves, chief engineer Montreal Tramways and chairman of the special committee on the proposed standardization of steel rails for electric railways, presented a report which was referred to the new executive committee.

Copyrighted papers, to be distributed only to officials of member companies, were read as follows: "Development of Tourist Traffic on Observation Cars," by R. M. Reade, superintendent city division Quebec Railway, Light, Heat & Power Company; "A Proper Accident Department," by C. L. Wilson, assistant manager Toronto & York Radial Railway; "Jitney Competition," by E. P. Coleman, general manager Dominion Power & Transmission Company; "Coasting," by A. Gaboury, superintendent Montreal Tramways; "Economy in the Electric Railway Repair Shop," by E. A. W. Turbett, mechanical superintendent Quebec Railway, Light, Heat & Power Company, and "Methods to Minimize Fire Risks and Secure Reduction of Premiums," by J. H. Ryan, New York.

Officers for the ensuing year were elected as follows: President, James D. Fraser, director and secretary-treasurer Ottawa Electric Railway; vice-president, E. P. Coleman, general manager Dominion Power & Transmission Company; honorary secretary-treasurer, Acton Burrows. The new executive committee includes: A. Eastman, vice-president and general manager Windsor, Essex & Lake Shore Rapid Railway; A. Gaboury, superintendent Montreal Tramways; H. G. Matthews, general manager Quebec Railway, Light, Heat & Power Company; M. N. Todd, president Galt, Preston & Hespeler Street Railway; C. L. Wilson, assistant manager Toronto & York Radial Railway.

COMMUNICATION

Motor Ventilation

KANSAS CITY, MO., July 10, 1915.

To the Editors:

There have been several interesting and instructive articles on the advantages and limitations of ventilated motors published in the ELECTRIC RAILWAY JOURNAL within the past few months. Before the appearance of these articles the receivers of the Metropolitan Street Railway Company of Kansas City had contracted for fifty four-motor equipments of the ventilated type for cars which have since been delivered, and it has been suggested to the writer that perhaps the street railway operators generally may be interested in knowing what considerations affected the choice of these motors.

It is recognized that the service conditions under which motors are expected to perform have an important bearing upon the design selected, and as the conditions under which motors operate in the two Kansas Cities are very severe there are hereinafter given the service requirements under which the new motors are expected to perform, as well as the circumstances which guided the Board of Control of the Kansas City properties in deciding upon the selection of the ventilated type of motor for service under these conditions.

The specifications under which the motors were purchased set out the service conditions under which the equipment would be required to operate as follows:

Weight of empty motor car completely equipped without motors and gears and gear cases	32,500 lb.
Average load of passengers and crew	4,500 lb.
Maximum load of passengers and crew	18,000 lb.
Typical run	Troost Avenue
Length of round trip	10.6 miles
Morning rush-hour running time (excluding two-minute layover time)	66 minutes
Mid-day running time (excluding two-minute layover time)	63 minutes
Evening rush-hour running time (excluding two-minute layover time)	68 minutes
Average trolley voltage	525 volts
Average stops per round trip	77
Average length of stop	9 seconds
Diameter of wheel	30 in.
Maximum grade	9½ per cent
Other excessive grades	800 ft. of 8 per cent grade; 4300 ft. of 3½ per cent grade; 3100 ft. of 5 per cent grade
Average rate of acceleration and braking	1.75 m.p.h.p.s.

In addition, the manufacturer was required to guarantee that after continuous running, including both the morning and evening rush, carrying during the total time the average loads above indicated and also including two successive round trips during evening rush with loads of 80 per cent of the maximum indicated over the entire out-bound trip only, no part of the motors would show a temperature rise exceeding 70 deg. C. above the temperature of the surrounding air, excepting the commutator, which might show an 80 deg. rise.

As a result both of the bids received and of detailed investigation into the whole subject, as applying to local conditions, the following conclusions were drawn:

1. There is a very perceptible decrease in weight by use of the ventilated type of motor.

2. That the service or continuous capacity of the ventilated motor was from 40 per cent to 50 per cent above that of the non-ventilated motor, having the same one-hour rating, assuming that the proper balance of design exists in each.

3. That on a basis of the same continuous capacity, the cost of the total equipment of the ventilated motor type was from 20 per cent to 25 per cent less than that of the non-ventilated type of motor.

4. That the temperature was maintained more uniform throughout the motor in the ventilated type.

5. Owing to the elimination of hot spots, the maintenance of the ventilated type should be materially less.

As to the objections, the fact that water might enter the ventilated type of motor and put it out of commission was raised as a serious objection, in that we have many stretches of track located in low spots, subways, etc., subject to overflow, and were this objection well taken we would not have been able to use the ventilated type. However, it has been our experience that the non-ventilated type of motor being also provided with drain holes in the bottom of the frame cannot be operated through water with the current on. In other words, so far as the damage from water is concerned it is virtually on the same plane as the ventilated type of motor. The second objection was that of the possibility of dust accumulating in the air passages, preventing the dissipation of heat and causing ultimate breakdown. This condition was found to be more inherent to the duct type of armature, and difficulty was not expected from this source, as the motor was so designed as practically to eliminate dust pockets. Good maintenance demands that motors of all types should be regularly blown out and cleaned, and we expect to remove all possible difficulty by giving the motors the care they should receive when on the pits. It was also stated that snow would cause trouble, but we believe the design of the motor is such as to make it exceedingly difficult for even a slight amount of snow to enter, or only so little as would cause no trouble.

Therefore, so far as the bids received were concerned and in view of the guarantees given, it was our experience that we could get a lighter motor of greater service capacity with less maintenance cost at a 20 per cent to 25 per cent decrease in price. There could hardly be a question as to the choice made under these circumstances.

PHILIP J. KEALY.

Specifications for Track Material

At the recent convention of the American Society for Testing Materials specifications were presented to cover heat-treated high-carbon-steel splice bars. These conform quite closely to the recommended specifications for untreated hard-steel splice bars of the American Electric Railway Engineering Association, except, of course, as regards the heat treatment. The practical points of difference in the two specifications are that the A. S. T. M. provide for a check analysis from finished bars by the purchaser if desired, with an increase in the phosphorous content of 25 per cent over the ladle analysis; that the bend-test arcs are 50 per cent greater in the A. S. T. M. specifications, and that a variation in size of hole of only 1/32 in. is allowed by the A. S. T. M. Provision is made for the retreatment of bars that failed in tests, one or more heat treatments being allowed.

At the same convention specifications were presented for heat-treated steel track bolts, and a revision was submitted for the existing standard specification of the A. S. T. M. for yellow-pine bridge and trestle timbers, this applying to solid members and not to composite members.

The Boston Elevated Railway has converted a small open car into a traveling display of scenes in parks on or near the local system and will operate the equipment over many routes during the coming months. On each side of the car are mounted three oil paintings illustrating scenes at Norumbega, Franklin, Marine and Lexington Parks, with large maps showing the location of these breathing spaces as well as the Blue Hills and Middlesex Fells. The canvases call attention to the natural and artificial attractions at these outing places. In place of the usual destination signs the car carries the designation "Trolley Outings."

Equipment and Its Maintenance

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

(Contributions from the Men in the Field Are Solicited and Will be Paid for at Special Rates.)

Experimental Open-Car Reconstruction in Atlantic City

BY GEORGE F. FABER, GENERAL SUPERINTENDENT ATLANTIC CITY & SHORE RAILROAD

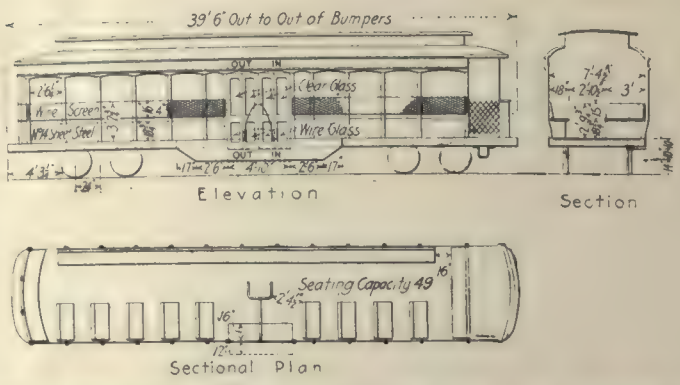
Two old-style, open, running-board cars were remodeled by this company for this season's traffic into center-entrance cars as shown in the accompanying illustrations. The open-car feature was retained as an absolute necessity in a seashore resort like Atlantic City, where the principal attraction to visitors, as far as car riding is concerned, is a ride down the coast in some kind of an open car. By the adoption of the plan described below it would seem possible to get every advantage of the pay-as-you-enter method of car collection and additional protection from accident hazard without sacrificing any of the advantages of the old type of car excepting seating capacity.

While it is not claimed that this construction is an entirely novel one, there are some features different from those previously described in the columns of the ELECTRIC RAILWAY JOURNAL.

The remodeled cars were twelve-bench cars, 39 ft. 6 in. over bumpers in length, 7 ft. 10½ in. over side-posts in width, the floor level being 2 ft. 10 in. above the rails. They were equipped with double trucks, 25 ft. 6-in. on centers with 30-in. wheels. The trucks were of the Brill 27G type.

In remodeling, one side sill was dropped at the center to provide three step heights, 10 in., 10 in. and 14 in. respectively. A drop girder was added to stiffen the sill. On one car we put a Prepayment Car Sales Company door with step-controlling mechanism, and on the other a J. G. Brill Company equipment. On each car a conductor's stand was located as shown in the drawing. In arranging for the seating, as shown, the rear bulkhead was removed and only the seat behind the front bulkhead was retained. The two plans used in inclosing the sides for a height slightly more than 3 ft. above the floors are shown in the accompanying halftones. In one a sheet-steel sheathing was applied for half this distance and a substantial screen for the remainder. In the other the screen was used alone. The former plan gives a more finished appearance to the car, while the latter allows a somewhat better circulation of air.

A specially-arranged spring seat is provided for the motorman which is removable when not in use. The register is operated by the conductor by means of a foot-lever-control mechanism running under the car floor. A Consolidated Car Heating Company buzzer system permits the passengers to signal to the conductor, who in turn signals to the motorman by means of a bell operated from a push-button arranged handily on the operating stand.



RECONSTRUCTED OPEN CARS—DETAILS OF ENTRANCE, SEATING, ETC.

Conditions in Atlantic City are such that a larger car than that now in use could be operated to advantage, conditions being favorable to trailer operation, although the company does not favor such operation at present. While it is true that a larger seating capacity is desirable, it must be remembered that the Atlantic City season is short and the traffic very variable, so that a smaller type of car used in numbers to suit the traffic can always be operated to advantage. After all, a good, safe, service car with as many of the features of the open-bench car as can be obtained is what is most needed.

The Atlantic City & Shore Railroad has a large number of near-side cars in which the "in-and-out" plan is used, while on the experimental cars the "all out" and "all in" plan is used. The result is that there is a little confusion this summer on the part of passengers. This confusion was unavoidable, however, in the carrying on of the present experiment. The center-entrance plan was devised partly to avoid confusion and extra walking on the part of the passengers which would have resulted had the rear-entrance and front-exit plan been adopted. This would have been prefer-

RECONSTRUCTED OPEN CARS—REMODELED CAR WITH SCREENS ONLY

RECONSTRUCTED OPEN CARS—REMODELED CAR WITH STEEL SHEATHING

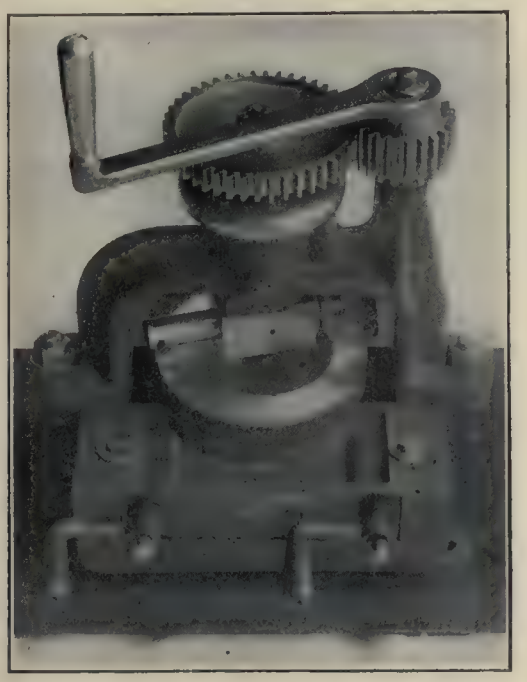
able in many ways but it would not have worked in well with the use of near-side cars.

From the experience with the reconstruction of the two samples the cost records show that if the cars can be put through the shops in lots of ten the cost of remodeling each car will not be more than $550. These cars will be run during the present season experimentally before plans for remodeling additional ones are worked out.

Motor-Bearing Trimmer

BY E. L. STEPHENS, MASTER MECHANIC, LOS ANGELES (CAL.) RAILWAY

Having adopted a standard babbitt-lined motor bearing, special forms have been made by the Los Angeles Railway for use in rebabbitting them. All bearings are trimmed and oil-grooved before they leave the shops for the different divisions. However, owing to our company having a gage of only 3 ft. 6 in., we have no room



MOTOR BEARING TRIMMER USED AT LOS ANGELES

for an axle collar. Hence it is necessary to face all wheels hubs for a motor brass collar bearing. As there is a slight variation of the distance between the motor and wheel hub, the motor brass collar cannot be completed for service at the shops. This slight variation is overcome by using a home-made motor-bearing trimmer, with which every division is furnished. This shop kink consists of a self-centering clamp attachment which holds the bearing firmly, and attached thereto is a rotary automatic self-feeding cutter which is operated by hand, to trim the collar to any desired length. This little machine eliminates all lathe work, and as it is automatic it can be operated by any employee. Its operation is such that the trimming of a pair of bearings can be completed on this trimmer in less time than it would take to center the bearings on a lathe.

Record time was made by the Chattanooga Railway & Light Company, Chattanooga, Tenn., in replacing the old cables on the Lookout Mountain incline. Heretofore several days have been required to complete the installation of the new cable. This year the exchange was made in two days. The cables have to be renewed about every two years.

Railway Motor Gearing

BY W. L. ALLEN, COMMERCIAL ENGINEER R. D. NUTTALL COMPANY, PITTSBURGH, PA.

As a result of the presentation of a paper by the writer on "Railway Motor Gearing" at the recent meeting of the Central Electric Railway Association, abstracted at length in the issue of the ELECTRIC RAILWAY JOURNAL for June 26, page 1201, a number of questions have been asked. In the belief that the answers to these questions may be of interest to railway men other than those who propounded the questions, these answers are given with the questions in the following paragraphs:

Question No. 1.—How will the railways which purchase gearing to specifications know whether the material so purchased meets the specifications?

Answer.—The railways with inspection and testing departments can arrange to have all material on order tested and inspected before shipment. In that case the manufacturer must provide the proper facilities for such testing and allow the inspectors free access to his plant at all times during the course of manufacture of the material. Properties not having such testing departments can have this work done for them by commercial testing laboratories, or can secure from the manufacturers test reports covering any materials shipped on their orders. If the number of pieces on order is sufficient to warrant a physical test, the report should show the physical properties of the piece selected to represent the lot, while the surface hardness of each piece can be identified by a serial number plainly stamped on each gear and pinion appearing in the report. For example, a typical test report might be as follows:

Customer's order No.....
Date.....
Invoice No.....

	Serial Number	Surface Hardness
	518-363	555 Brinell
	518-364	532 Brinell
	518-365	555 Brinell
Test Taken	*518-366	512 Brinell

If a physical test is made, the serial number of the gear or pinion from which the test piece was machined and the physical properties should be shown as follows:

Test Taken * Serial Number 518-366 Surface Hardness 512 Brinell
Ultimate tensile strength.....125,425 lb. per sq. in.
Yield point ..... 85,500 lb. per sq. in.
Elongation in 2 in.....16.4 per cent
Reduction of area.....41.9 per cent

Question No. 2.—Will the purchase of gearing to specifications increase the cost of this gearing?

Answer.—Each variation in the chemical composition of the steel used in the manufacture of gearing, or in the temperatures and duration of heating and cooling during heat treatment, or in fact any variation in the process, tends to produce non-uniformity in the resultant material. To insure against such non-uniformity the progressive, conscientious manufacturer has found that it is necessary constantly to test his product in practically the way described in the C. E. R. A. paper. The sale to specifications, therefore, should only require the additional work made necessary by the reporting of this test information to the railway and should not increase the purchase price of such gearing. It will, however, have a tendency to increase the cost of production of the unscientifically manufactured material, which increase will be more than compensated for in the increase of the life and efficiency of this class of material.

Question No. 3.—Will the purchase to specifications relieve the gearing manufacturer of his responsibility for breakage or poor life?

Answer.—The equitable adjustment of claims and

complaints, which is of as much value to the purchaser as to the seller, requires first determining the exact cause of failure. The purchase of gearing to trade names, without a comprehensive knowledge of the characteristics of the material on the part of the purchaser, is apt to produce an unsatisfactory situation in the event of failure, due to the natural tendency of both parties involved to feel that the failure lies within the other's sphere. On the other hand, when supplies are purchased to specification the determining of the cause of failure is greatly simplified by following a natural course of inquiry. If, for instance, the unsatisfactory material failed to meet the specifications, placing the responsibility is not difficult. If it meets the specifications, the failure may be due either to defective installation, operation or maintenance, or to a wrong application of the particular grade of material in the specific service. By a process of elimination an investigation may show that the failed material was only an isolated case due to some error as in the above list, or it may show that some inherent weakness exists in operation or maintenance methods which can be entirely corrected. If there should be an epidemic of such failures in a specific service and caused by operating conditions not possible of change, such an investigation may develop the fact that a grade of gearing of greater strength, toughness or surface hardness must be used.

Now, while an elaborate investigation is impracticable in each instance, the intelligent consideration of the above outlined phases of gearing operation and maintenance conducted by the manufacturer, together with the operator, cannot fail to educate the manufacturer as to the service to which his material must be subjected, as well as permit the operator to learn the requirements of gearing for his service. This mutual education will undoubtedly greatly minimize failures and increase possible economy through wise selection, as well as provide the necessary data for satisfactory adjustment. It would seem, therefore, that rather than relieve the manufacturer of his responsibility, purchase to specifications increases this responsibility and in reality leads to his rendering a service to the railway of unlimited value in the selection of that grade of gearing best suited to the specific service in question.

One-Man Cars at San Francisco

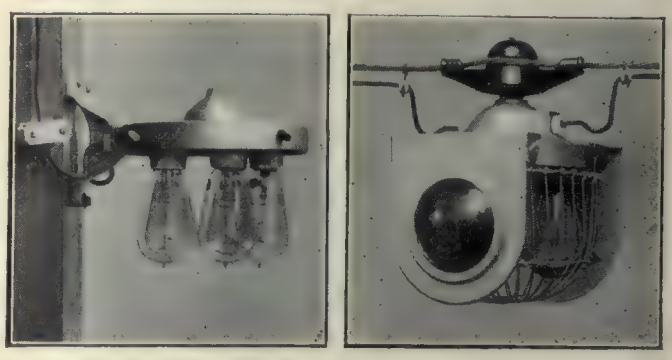
The United Railroads of San Francisco now has in operation three double-truck and six single-truck cars in one-man service. All are used on outlying lines where the receipts average less than $1 per car-hour. New cars were not bought for this service, old rolling stock being rebuilt for the purpose. The principal changes made in the double-truck cars were the locking of the rear platform, the installation of folding steps and air-operated mechanism for opening and closing the sliding doors. The same changes were made on the single-truck cars except that hand-operated mechanism was installed for the doors. The double-truck cars are fitted with Johnson fare boxes, while the single-truck cars have the customary register mechanism with overhead rod connections. The fenders at each end of the cars are lowered at all times, and double poles and bases also are provided so that the car operator need not leave the car when changing the running direction.

The first one-man cars were installed about two years ago, the service being gradually increased to the number previously mentioned. The company contemplates the conversion of the Pacific Avenue cable line, using seven cars, to one-man operation after the Panama-Pacific Exposition has been closed. Like the other one-man cars they will be rebuilt at the company's shops.

Out-Door Light Clusters

Because of the demand for light clusters that will stand all kinds of weather the G. E. Painter Company, Baltimore, Md., has brought out a number of improved designs of the five-lamp and single-lamp types which can be fitted with enamel signs and signal lenses for crossings, stations and similar locations where light is needed. All of them are made of cast iron of about 3/16-in. thickness, and as they are heavily galvanized they should have long life. The bodies are fitted with porcelain Edison receptacles, held in place by brass screws so that they can easily be replaced in the event of breakage.

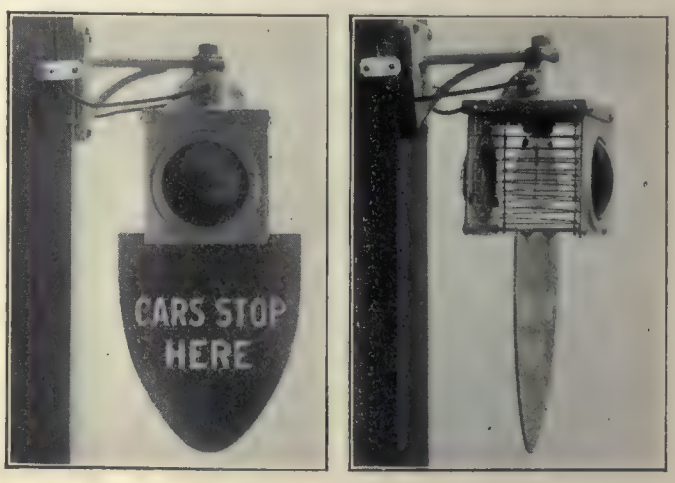
The receptacles for the five-light clusters are connected in series to suit the 550-volt railway current, and are so arranged that they cannot become short-circuited or grounded by rain and snow, or damaged by lightning. In case it should be desirable to change the cluster to



SIDE-SUSPENDED FIVE-LIGHT CLUSTER AND TOP-SUSPENDED TYPE WITH LENSES AND LAMP GUARD

the three-light or four-light type, so as to use lamps from the series of five for other purposes, it is an easy matter to make the necessary connections without "bridging" the cluster receptacles.

The lens holders or shields for the clusters are also made of galvanized cast iron, these being arranged to suit 4½-in. semaphore lenses, and porcelain enamel signs as shown in the accompanying illustrations, can be attached as desired. The holders or shields are held in position by means of brass screws, and the drilling is such that either one or two lens holders can be used in connection with the clusters. The lens holders are arranged to be placed on one of the three sides of side-supported clusters, and on four sides of the top-suspended type to suit the different conditions, but when two holders are used they must be placed opposite to each other, as the shield extends more than one-fourth around the body of cluster. The top-suspended clusters



SINGLE-LIGHT SIGNAL WITH LENSES AND SIGN

may be hung either from a bracket or from a span wire, as most convenient, the side-suspension type being specially designed for attachment to a wall or pole.

Universal Register for Electric Railway Service

Ohmer's "Universal" register is the latest fare-protecting device manufactured by the Ohmer Fare Register Company. It has been built in response to the growing and insistent demand for an indicating and recording fare register which will handle all denominations of cash fares, whether the amounts be in odd pennies or not, and which will also register all tickets, mileage tickets, etc., according to their actual cash value.

VIEW OF UNIVERSAL TYPE OF REGISTER

The use of the register will permit interurban railway companies at any time to change their fare rates quickly and without the necessity of any change in the register mountings or mechanism. The register can also be used interchangeably on any division or can be operated even over the lines of another company without any mechanical readjustment whatever.

Notwithstanding its large capacity, the machine itself is compact in appearance and is simple and positive in operation. Any cash fare or ticket value from 1 cent to $9.99 inclusive can be quickly registered and simultaneously indicated and the amount thus indicated cannot be changed until a fare of a different denomination is registered.

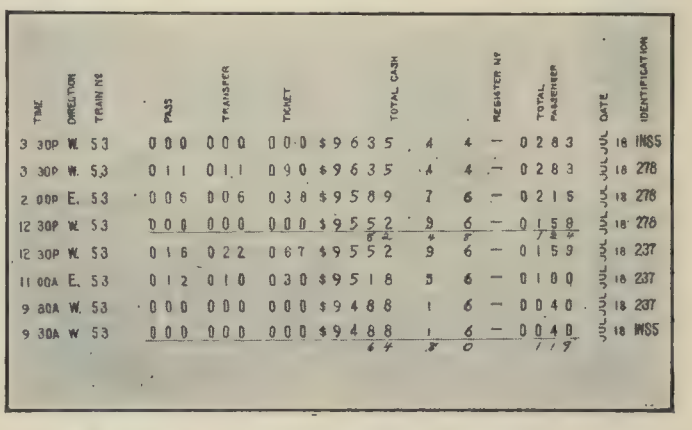
With this register tickets are recorded in two ways—as a ticket in the "ticket" column, and as cash in the "cash" column. These two registrations are made simultaneously and with no more trouble than a single registration, in fact, the operation really is a single registration. The turn-in is checked also in two ways, the number of tickets received being checked against the ticket column and the cash value of the tickets received being checked against the cash column. In this case the tickets are counted in as so much currency and according to their actual cash value. This method of registration and checking is the same in the case of mileage tickets. The strips lifted are registered as tickets and the cash value of each strip is added to the cash column by the register. The balance in the cash column after deducting all ticket values is the actual cash collected by the conductor.

Special attention should be given to the thoroughness and accuracy of the check secured by this method of registration and its effectiveness in preventing substitution of any kind. The register indicates exactly the kind of fare being registered and also its value, and the public indication is very plain and absolutely unmistakeable.

The new design contains a number of improved features not found in the earlier types of Ohmer registers and these make it absolutely foolproof. Among these are the following: At the completion of each conductor's run all printing counters are turned back to zero with the exception of the total passenger and total cash counters. This provides a check between the records of successive conductors, and between the closing figures of one day and the opening figures of the next. The register cannot be operated unless the detail counters are previously turned to zero. The conductor then takes an imprint with his identification key in the register. His identification key is locked in the machine with the registration of the first fare, and it cannot be removed until he has taken a final imprint to close his day's report. Neither can the conductor operate the register after he has turned the total passenger indicator to zero unless he takes an imprint of the fares registered up to that time.

A record sheet from the new register is shown in the accompanying illustration. From this will be seen the large amount of useful data contained in the small space. The time, the direction, the train or trip number, the date, and the conductor's and inspector's identification key numbers are regular Ohmer features and are self-explanatory.

The register from which this record is taken is mounted to record pass, transfer, ticket and cash. Reading from left to right the last print made by conductor 237 at 12.30 p. m. (the fourth line from the bottom) it appears that he registered sixteen passes, twenty-two transfers and sixty-seven tickets and cash or cash values amounting to $64.80, the latter being found by deducting the first from the last print in the total cash column. The deduction in the total passenger column shows that there were carried a total of 119 passengers. By deducting the total number of paper collections from the total passengers the number of cash-



TIME	DIRECTION	TRAIN NO	PASS	TRANSFER	TICKET	TOTAL CASH		REGISTER NO	TOTAL PASSENGER	DATE	IDENTIFICATION
3 30P	W.	53	000	000	000	$9635	4	4 —	0283	18	INSS
3 30P	W.	53	011	011	090	$9635	4	4 —	0283	18	278
2 00P	E.	53	005	006	038	$9589	7	6 —	0215	18	278
12 30P	W.	53	000	000	000	$9552	9	6 —	0158	18	278
						64	4	5	7 8 4		
12 30P	W.	53	016	022	067	$9552	9	6 —	0159	18	237
11 00A	E.	53	012	010	030	$9518	5	6 —	0100	18	237
9 30A	W.	53	000	000	000	$9488	1	6 —	0040	18	237
9 30A	W	53	000	000	000	$9488	1	6 —	0040	18	INSS
						64	5	0	7 1 9		

VIEW SHOWING TYPICAL REGISTER RECORD FOR TWO CONDUCTORS

paying passengers is ascertained, which in this case is 14. In general the register has been built for practical utility and to produce a condensed report, rather than for elaborate headings and unnecessary data which would necessitate more complicated and a less easily operated machine.

In the operation of the register no ticket can be registered unless a cash value is also registered and indicated, the cash indication appearing adjacent to the word "ticket." For example, if a ticket valued at $1.61 is registered the indicator reads "Ticket $1.61." If the amount collected is actual cash the indicator reads "Cash $1.61" and the register is locked against operation if the indicator is made to read "ticket" or "cash" with no cash amount following. Where "Pass" or "Transfer" are registered and no cash value is assigned the indicator simply shows "Pass" or "Transfer" and the space for the cash indication remains blank. All indications appear in the face of the register and are duplicated in various parts of the car by the auxiliary

indicators so that every passenger becomes immediately aware of each transaction. The auxiliary indicators are plain and easily read and follow the full reading of the register. The operating rod is equipped with sets of grips at convenient intervals and the process of selecting the fare to be registered is quickly and easily accomplished.

Ground Fittings for Lightning Arresters

The Electric Service Supplies Company has recently extended its line of Garton-Daniels ground fittings to include material for both ¾ in. and 1 in. pipe, and to take the various standard sizes of wire and cable used for grounding lightning arresters, pole and station apparatus, overhead ground wires, etc.

The brass cap shown in the accompanying illustration is furnished with a lug for soldering to the ground wire from the arrester. Certain types are furnished drilled to accommodate ¼-in. cable for grounding overhead ground wires. The pipe couplings are used for connecting two sections of ground pipe. They are particularly useful where the practice of the operating company calls for the extension of the ground pipe 8 ft. or 10 ft. up the pole, and under these conditions it is readily seen how much more convenient it is to drive first an 8-ft. length into the earth and then couple on

GROUND POINTS, COUPLING AND CAP FOR LIGHTNING ARRESTER CONNECTIONS

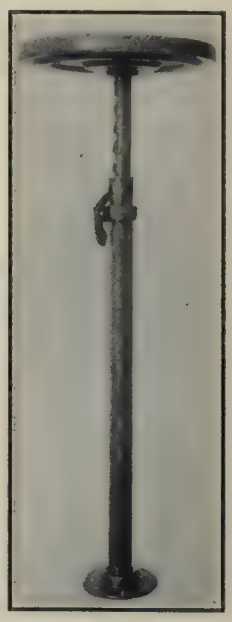
the extension, than it would be to drive a 16-ft. length. The brass couplings, as illustrated, are employed in grounding lightning arresters on electric railway systems to accommodate either the wire or the free end of a stub-end terminal bond in tying in the lightning arrester ground to the rail.

The ground pipe points are of malleable iron, heavily galvanized. The external type of ground point is generally to be preferred. It is of slightly greater diameter than the pipe and in driving opens a hole in the earth of a diameter slightly greater than the diameter of the pipe. This decreases the friction on the surface of the pipe as it is being driven, and allows the pipe to be easily driven to the proper depth without danger of bending or splitting. After driving, the earth gradually closes in tightly around the pipe, and in an hour or so a thoroughly efficient and reliable ground is secured.

Internal ground points are designed with a head suitably proportioned to fit snugly inside an iron pipe. Their external diameter is the same as that of the pipe. They may be used only in soft earths because the point, being of the same diameter as the pipe, does not open up the earth for its driving. The friction that is exerted on the outside of the pipe renders driving to the proper depth very difficult because the pipe itself will in many instances bend or open up. Where the soil is soft internal points may be used, but where there is much rock or clay in the soil external points should be used.

Quick-Acting Adjustable Seat for Motormen

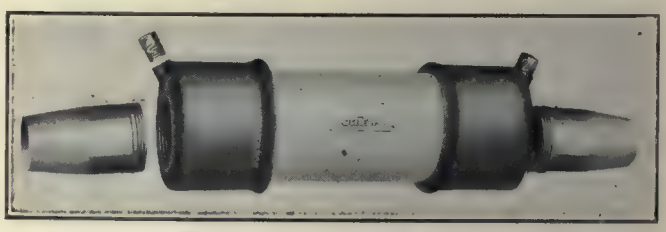
The Railway Specialties Corporation, New York City, has brought out a new quick-acting adjustable seat for motormen which has been designed especially with regard to light weight, so that it can be transferred from one end of the car to the other with a minimum of effort. The adjustable feature of the seat is entirely new, and this permits raising it to any desired height merely by lifting it. The seat mast is notched, and a gravity dog is provided on the sleeve in which the mast slides, the point of the dog holding the mast in position by engagement with the notches on the mast. In order to lower the seat the gravity dog is touched, thus releasing it from the notch in which it is caught and permitting the seat to fall to its lowest position. The seat can thus be adjusted between a height of 24 in. and 31 in. from the floor. A dowel set in the side of the seat mast travels in a slot that is cut in the sleeve and prevents the seat from turning with relation to the sleeve. No other parts are involved in the construction so that its simplicity and ruggedness are obvious, the accompanying illustration showing these features to excellent advantage.



ADJUSTABLE SEAT FOR MOTORMEN

Combination Cable Insulator and Splicing Sleeve

A new type of insulator in combination with a splicing sleeve for underground cables has just been brought out by the Drew Electric & Manufacturing Company of Indianapolis. The device is especially valuable in reducing electrolysis troubles as it serves to destroy the conductivity of the cable sheath by dividing it into short sections insulated from each other. It also eliminates the danger of leakage at the splice and may be



CABLE INSULATOR PARTLY DISSEMBLED

used to excellent advantage in manholes at building entries, preventing the cable sheaths from collecting stray currents from the pipes or other cables on the same support. It may be used also to separate cables that are grouped near power-house switchboards.

The device consists of a high-grade porcelain tube, 12 in. long, with malleable castings leaded onto the ends. Each of the castings has a ⅜-in. gas-pipe plug hole in it, and on the center line are cast-brass tubes which fit the cable sheath and screw into the malleable castings. To install the device the brass end tubes are unscrewed and slipped over the ends of the cables that are to be spliced. The main body of the insulator is

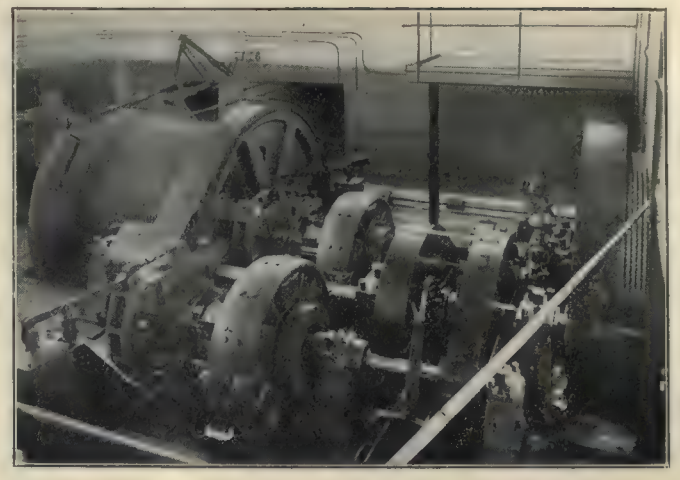
then slipped over one cable end and the splice is made in the usual manner. The insulator is then drawn over the splice, the brass end castings are screwed into place, and wipe joints are made between the ends of the brass castings and the cable sheath. The insulator is then filled with splicing compound through the gas-pipe plug holes and the plugs screwed into place, leaving the splice protected absolutely from mechanical or electrical damage. The weight of the complete device is 17 lb., and it is made to suit any size of cable.

Hamilton Electric Incline Railway

A complete electric hoist equipment has recently been installed by the Hamilton Mountain Park Company, Ltd., Hamilton, Ont., Canada, to operate its incline railway for transporting passengers, freight, automobiles, trolley cars, teams, etc., up the "Mountain," as it is called. This incline gives access to a large tract of land owned by the company at the top of the mountain and also to the fertile country beyond. The "Mountain" is really the Niagara escarpment, as the high bluffs behind Hamilton are prolongations of the heights at Queenstown, over which the Niagara River originally flowed before cutting back the gorge to the present falls, the difference in elevation between the general level of the city and the plateau back of the bluffs being 325 ft. The railway was formerly operated by a steam-hoist equipment, but this had become inadequate to handle safely and quickly the rapidly increasing traffic, and had to be replaced with electric equipment which was furnished throughout by the Canadian General Electric Company, Ltd.

Electric Hoist

In this arrangement a special double fixed-drum, double-geared electric incline hoist, built by the Lidgerwood Manufacturing Company, New York, operates two large platform cars in balance on an incline 800 ft. long with a grade of 40 per cent. Each car weighs 30,000 lb. and runs on tracks having a gage of 12 ft. 1½ in., the distance center to center of the tracks being 20 ft. 3 in. The average load on the cars is about 20,000 lb., reaching a maximum of 30,000 lb.



HOIST MOTORS, SOLENOID BRAKES AND FLYBALL GOVERNOR

The time required for making a single trip is ninety seconds, and the rest period between trips is three minutes. Attached to each car are two ropes of 1⅝-in. diameter, one of these being used for hauling the car, and the other for the purpose of safety. The average rope speed during the run is 585 ft. per minute.

The hoist is located in a house part way up the slope and the control is placed in an operator's cabin at the level of the summit. The main rope from the right-hand car is wound over the top of the right-hand hoist drum. The main rope from the left-hand car is wound underneath the left-hand hoist drum. The safety rope from the right-hand car is led over suitable deflecting sheaves to the top of the left-hand drum, and that from the left-hand car is wound over suitable deflecting sheaves to the bottom of the right-hand drum. Each of these sheaves is 7 ft. in diameter. There are four head sheaves and four deflecting sheaves. The former are arranged vertically so as to carry the hoist ropes and safety ropes in a direct line from the cars; the deflecting sheaves are placed horizontally at such an angle that the rope will be led in a direct line either to the top or bottom of the hoist drums, as the case may be.

VIEW FROM TOP OF HAMILTON MOUNTAIN PARK ELECTRIC INCLINE

The reason for reeving the safety ropes as outlined is that in case of an accident to the left-hand side of the hoist, the safety rope on the left-hand car would take care of it properly, being wound on the right-hand drum. The same thing would apply if the other drum of the hoist should become disabled; that is, the main ropes and the safety ropes from each car lead to opposite drums. Further advantage is gained by the fact that each drum is equipped with an independent double-acting brake, and in case either of the main ropes should fail, the safety rope will hold the cars. Furthermore, the safety rope, if called upon to take the load, will be controlled by all the automatic brake features in exactly the same manner as when the load is being handled by the main ropes. In actual operation the length of the safety ropes is slightly more than that of the main hoist ropes, thereby relieving the safety ropes of any hoist stresses other than those required to keep the ropes themselves in motion.

Operation and Safety Appliances

The operator's cabin is fitted with an electric controller and two hand-brake levers. The levers will not be used ordinarily, as the hoist is equipped with solenoid brakes operating on the motor shaft. The hand brakes, therefore, need be used only for locking the cars at the top and bottom positions or for cases of emergency. In starting a run the operator releases the drum-post brakes by the hand levers, puts his foot on a small foot pedal located at the bottom of the master controller, and then, by moving the handle of the controller either to the right or to the left, as the case may be, will start the cars, automatic acceleration to the normal rope speed being provided. At a predetermined point on the incline the controller will be automatically turned to such a position that the speed will be cut down to one-tenth of the normal and finally be turned to the off position, thus setting the solenoid brakes and bringing the cars to rest. Should the operator become disabled during a run, he will of necessity remove his foot from the foot pedal, thereby cutting off the current and bringing the cars to rest.

In case the cars should stop short of their landing positions, due to the automatic overwinding mechanism, there are available two or three points on the controller so that the operator can bring them to their proper positions. Should the cars fail to stop, due to the fault of the controller, an overwinding device is attached which will shut off the current and set the solenoid brakes. Should the speed of the cars exceed the normal by a predetermined amount, an overspeeding device is so arranged that it will trip a weight of 570 lb., which will set the drum-post brakes. This overspeeding device, or governor, is of the flyball type, and it will be caused to operate by an excessive speed, whether due to the motor or a breakage of the hoist parts. The emergency weight may also be tripped manually from the cabin.

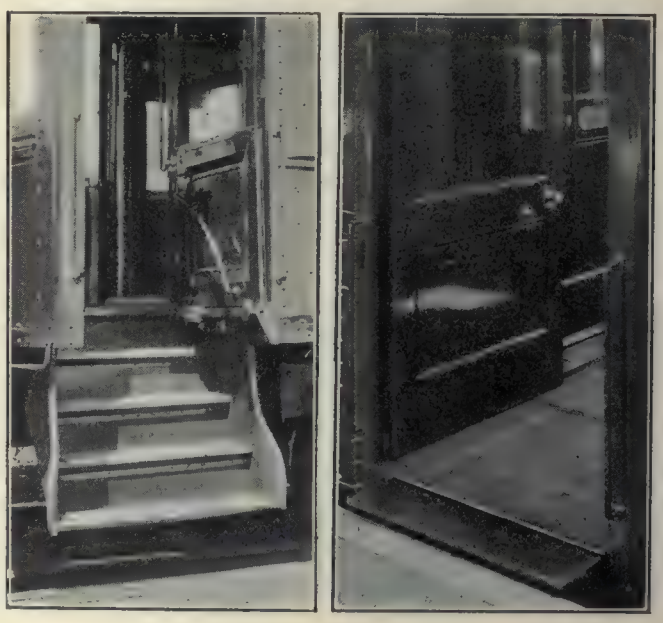
Power is supplied in the form of three-phase, twenty-five-cycle alternating current, and for changing this into direct current there has been installed a motor-generator set of sufficient capacity to supply the average demand of the hoist, plus some surplus for charging a large storage battery. The direct-current end of the machine is rated at 165 amp. continuously at 550 volts, the latter being the floating voltage of the battery, and it is designed with a special drooping characteristic by means of a reversed series field for the purpose of throwing load fluctuations on the battery. A small percentage of the load fluctuations falling on the machine will lower its voltage to such an extent that the battery must discharge and furnish the balance of the momentary demand. The regulation is, therefore, inherent in the design of the machine, and is entirely automatic. The hoist is driven through two gear reductions by a General Electric 180-hp. motor which is specifically designed to stand such voltage variations as come from a storage battery when it is frequently charging and discharging. A reserve 180-hp. motor and solenoid brake are provided.

Storage Battery

The storage battery was built by the Electric Storage Battery Company of Philadelphia. Its capacity is 200 amp. for one hour on a continuous discharge, and the makers estimate that it will operate the hoist under the average load conditions for nearly two hours with the power supply entirely cut off. Under normal conditions, with the motor-generator supplying the average load, the battery does not become exhausted, but receives back sufficient charge during the period of rest between trips to make up for the discharge while the hoist is in operation.

Extensible Trapdoor for Passenger Cars

The Pennsylvania Railroad Company has built at New York Terminal, Manhattan Transfer, Rahway and North Philadelphia high station platforms, and has under construction at the present time similar platforms at Wilkinsburg and Johnstown, on its Pittsburgh Division, this being in line with the policy of obtaining the best of railroad features. The advantages of the high platform are, of course, obvious, but a difficulty has arisen in connection with it where the station is located on a curve, because a gap then exists between the ends of cars and the platform edge. In consequence, the company has equipped for trial a steel vestibule car with an extensible trapdoor as shown in the accompanying illustrations which is designed to bridge this gap. The design is patented by Ellwood H. Sickels of Narberth, Pa.

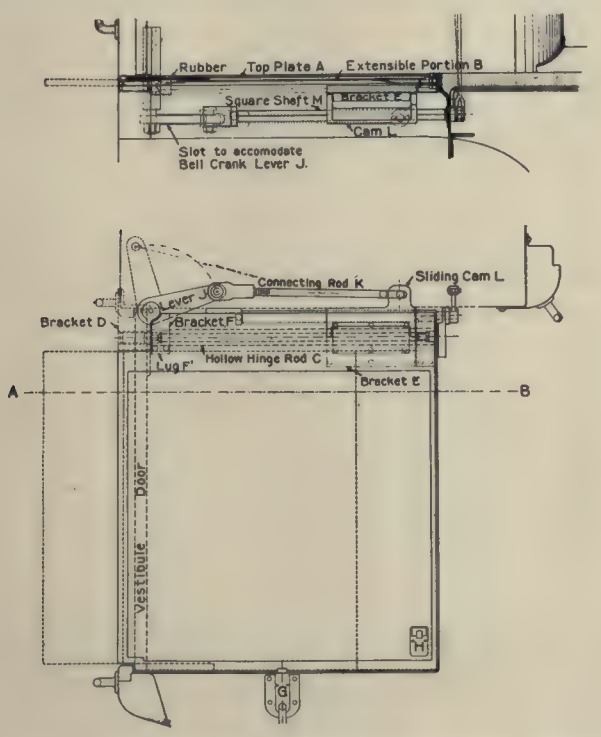


VESTIBULE TRAPDOOR IN RAISED AND EXTENDED POSITIONS

In operation when the trap is down, the opening of the vestibule door causes the sliding portion to extend, and the closing of the vestibule door retracts it. This arrangement is ideal in view of the fact that the extension of the trap is required simultaneously with the opening of the door, and, as the vestibule door is re-

quired to be closed when the train leaves the station, the trap is necessarily returned at the same time. Furthermore, the physical effort required to open the vestibule door is utilized to extend the trap.

There are, however, certain times when the trap should not extend when vestibule door is opened, as in the case when trap is to be raised so that the steps can be used or when the brakeman opens the door while the train is moving. To provide for this necessary feature, an ingenious, but still quite simple, arrangement is provided by which the connections can be thrown out of gear through the operation of a small handle set flush in the side of the vestibule at a convenient height. It is



PLAN AND SECTION OF EXTENSIBLE TRAP DOOR

not necessary to provide extra trainmen to attend to the operation of the trap, because when the small hand lever is set in proper position (which is done by the brakeman before the train reaches the station) the opening of the vestibule door, whether accomplished by trainman or passenger, will cause the trap to be extended. Owing to the fact that the top plate does not slide, it is, of course, impossible for passengers to be thrown by the movement of the extension. Furthermore, it is impossible for passengers to stand on the trap while the door is being opened.

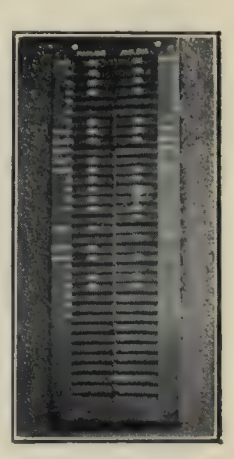
The trap is, in outward appearance, like the ordinary trap, and consists of a rubber-covered top plate and the extensible portion which is built in the familiar paneled pattern, and acts as a support for the top plate. The two parts are hinged on a hinge rod so that they act together when trap is raised for the use of the steps. The hinge rod is hollow and accommodates the flat springs which are adjusted at the usual bracket, to obtain the proper tension to raise the trap. The extensible portion of trap is supported by means of a bracket (marked *E* on the line cut) which slides on hinge rod, and also by means of lug *F'*, attached to top-plate bracket *F*. When the trap is extended, owing to the fact that it is supported at one side on lug *F'*, and at the opposite side on the usual angle-iron ledge, the extended portion cannot deflect when passenger steps on it. The usual spring catches, marked *G* and *H*, are used respectively to hold trap down when door is closed and to hold it up against vestibule door when trap is raised for use of steps.

The operating device consists of the bell crank lever *J*, which is attached to the vestibule door, the connecting rod *K* and cam *L*, which slides on the square shaft *M*. When the shaft *M* is tilted to place the sliding cam *L* in "off" position, the opening of the vestibule door causes the cam merely to slide on the shaft without any effect on the extensible portion of the trap. The shaft *M* is tilted by means of a small knob on the end of a vertical rod which is attached to a lever arm on the end of the square shaft, the knob being located in a recess at a convenient height in the vestibule wall. When the square shaft is thus tilted the sliding cam comes up in back of bracket *E*, on the trap, so that when the door is opened the sliding part of the trap is extended. The sliding cam is designed so that whether in "on" or "off" position, the front finger of the cam is always in position to hold the extensible part of the trap, so that it is absolutely impossible for the trap to be out with the door closed. Also, the trap is arranged so that it cannot be raised when extended, thereby preventing the obstruction of the handrail at the side of the car.

The trap is designed with a uniform extension to take care of the gap at platforms built on as sharp a curve as 6 deg. On lighter curves the extension may overlap the platform an inch or two, the station platform, of course, being kept at the height of a small step below the floor of the car.

Indicator Board for Disconnecting Switches

At the Manchester Street generating station of the Rhode Island Company, in Providence, R. I., a convenient indicator board is utilized to show incoming operators the positions of disconnecting switches between the various generators, rotaries, transformer units, etc., and the main and auxiliary buses. The board consists of a panel about 3 ft. long and 10 in. wide, carrying about thirty-six wooden strips indicating whether a particular knife switch is in or out of circuit. The strips can be slid in and out with ease, and whenever a disconnector is opened or closed, a notation is made to correspond on the board. In this way any operator coming on duty knows at a glance just what switches are open or closed, and does not have to rely upon another's memory or upon loose paper memoranda. The remote-controlled oil switches in the station are equipped with the usual pilot lights, but when disconnectors of the knife type are opened or closed no electrical indication is feasible, and the maintenance of such a bulletin board is a decided convenience. In this station all the disconnecting knife switches are equipped with locking devices which prevent their being blown open by magnetic reactions in case of a short-circuit or severe overload on any given feeder. The switches are mounted in concrete cells provided with wired-glass covers, so that inspection is greatly facilitated.



INDICATOR BOARD

The Interborough Rapid Transit Company proposes to install at the Fourteenth Street subway station platform for southbound express trains five additional space-filling devices, similar to the one already in service. The device is a movable platform edge which automatically fills the gap between the trains and the curved platform, and has been described and illustrated in the ELECTRIC RAILWAY JOURNAL.

News of Electric Railways

CHICAGO ARBITRATION AWARD

Summary of Award to the Surface Men Made by the Arbitrators on July 16

Mayor Thompson and State's Attorney Hoyne informally announced the arbitration award to the men on the Chicago Surface Lines on July 16, granting an increase in the minimum wage from 23 to 25 cents for the first year of the contract and 26 cents for the second year. The maximum wage is increased from 32 cents in the sixth year to 35 cents in the fourth year. This scale is to be increased to a 36-cent maximum in the second year of the contract. The award to men outside of the train service is not announced. The railway reiterates its intention to abide by the decision of the arbitrators. Mr. Sheean, representing the company on the board, will submit a minority report. The Chicago Elevated Railways not being bound to accept the award intends to conduct another arbitration.

Final arguments by both sides were made on July 9. To preserve the principle of arbitration both the railway companies and the men agreed to shorten the period required to submit evidence and the arbitrators agreed to render their decision promptly.

Dissatisfied with the manner in which the men presented their case, all the witnesses having been officials or committeemen of the union, the Mayor requested the railways to furnish him with the names and addresses of all employees. In round figures this list included 10,000 names and addresses, and from these the Mayor invited 360 to call at his office and discuss the need of increased wages and better working conditions.

On July 7 Mr. Weatherwax was cross-examined regarding the various positions he had held with the company. Mr. Weatherwax stated that he began service as a boy at day wages, and now received $10,000 a year as superintendent of transportation. He was also questioned regarding the wages of receivers at the car stations, and an effort was made to show that those who were taken into the union received more than those who were outside. In the dispatching system practically all switchboard operators were old trainmen. The question of vacations to clerical help and not to trainmen was also raised.

Several division superintendents' testimony was to the effect that working conditions had greatly improved and that five minutes was sufficient time for the conductors to turn in.

Thomas Blakely, superintendent of supply cars, explained the duties of the motormen working for him. He said that they rarely assisted in loading or unloading a car; they ran slowly, and were not required to stop as often as passenger cars, therefore could hold their place on a line without speeding. These motormen also had regular hours and were not required to wear uniforms. They were not on the street during rush hours, and were seldom asked to run their cars into the downtown district.

Edward W. Anger, general carhouse foreman, explained the duties of the various grades of repairmen. He stated that no particular skill was required in making running repairs. All heavy repairs were made at the shops. Most of the carhouse repairmen were ordinary laborers without previous training. Temporary promotion created bad feeling when the men were returned to their former positions. He said that to give up the right to use judgment in the promotion of men would interfere with good results. Promotion based on efficiency did not open the door to favoritism. Regarding the three grades of pay that carhouse repairmen receive, Mr. Anger stated that the men acquired skill with experience, and should be paid for it.

President Busby again took the stand on the evening of July 7, to introduce and explain a number of exhibits. These included tabulations of passenger-car miles and hours, etc. Another exhibit showed the relative cost of living in Chicago as compared with other cities. In this Chicago was taken as a basis, with 100 per cent, St. Louis was given 100.13 per cent, Detroit 100.20 per cent, Cleveland 105.59 per cent, New York 117.32 per cent, Pittsburgh 117.92 per cent, Philadelphia 119.46 per cent, Boston 127.86 per cent. Mr. Busby stated that these figures were compiled from an analysis of Bulletin 156, United States Department of Labor. He also introduced an exhibit showing $45,713 a year as the cost of additional time under the new agreement for fall-backs and dinner reliefs. If five minutes additional turn-in time was given, the cost to the company would be about $65,000 a year. Concerning the 37,143 accidents referred to earlier in the hearings, Mr. Busby stated that these included only 8400 liability cases, 600 of which went to suit. He also accounted for the fatal injuries to twenty-two employees mentioned in Mr. Mahon's testimony. He said that an examination of the records showed that some of these men were not on duty, others were injured through their own carelessness, and the remainder through negligence of fellow employees. He also introduced an exhibit to show that the number of accidents attributable to trainmen according to years of service was on a constant decline.

Mr. Busby next offered testimony regarding the finances of the company. He said that brokerage profits of all companies in eight years past were $3,679,000, whereas the discounts were $4,839,000, an excess of $1,160,000. The 10 per cent construction totaled $7,358,000, and after deducting the excess, a net of $6,198,000 was left. He explained that 6 per cent of this amount went to the railways company and was applied against excessive indebtedness over purchase price and 40 per cent to the City Railway for disbursement as profits. He also stated that the average return to the companies on the purchase price of all roads for the past seven years was 6.52 per cent. Mr. Busby quoted from the daily reports of receipts since Feb. 1, 1915, and showed that the income so far this year was about $460,000 behind a like period in 1913.

In recross-examination of Mr. Busby, the preparations made for resuming service in the recent strike were outlined. Mr. Busby said that thousands of experienced men were ready to go to work, and that 25,000 such men had been offered to him within forty-eight hours after the strike was declared. He said that he had arranged for a sufficient number to resume operation and was ready to board and lodge them. He did not care to state what he expected to pay them.

At a short morning session on July 8, the representatives of the employees announced that they would not put any rebuttal witnesses on the stand, but had arranged to argue their case at once. After a short session the hearings adjourned until July 9, when final arguments by Counsel Miller for the companies, and Counsels LeBosky and Alschuler for the employees were presented. Immediately following these the arbiters began to review the evidence.

SEATTLE-RENTON PURCHASE BY CITY ABANDONED

The City Council of Seattle, Wash., has decided to abandon plans to take over the Seattle, Renton & Southern Railway by condemnation proceedings within city limits, and to repeal an ordinance passed in October, 1911, providing for the prosecution of the condemnation suit. The condemnation case is now in the United States Supreme Court, and Assistant Corporation Counsel Ralph S. Pierce will move its dismissal. Both the Superior Court and State Supreme Court held that the city of Seattle had the right to condemn the railway, but an appeal was taken by Scott Calhoun and Joseph Parkin, receivers of the company. It is proposed now to turn attention to the improvement of Rainier Avenue in order to dispose of all other litigation prior to the calling to trial in the United States District Court of the suit of the Seattle, Renton & Southern Railway and its receivers against the city, seeking an order from the court to restrain the city from changing or in any way interfering with the present grades of Rainier Avenue. In an opinion handed down some time ago the Federal Court ruled that the Seattle, Renton & Southern Railway had a legal right to its franchise, which the Council holds has been revoked. Councilman Dale, who has been active in carrying on negotiations for the acquisition of the line by the city, said recently: "I believe that since the voters have authorized a bond issue to purchase, parallel or condemn

a railway in Rainier Valley, the Council should keep faith with the voters and carry out the intent of the proposition authorizing the issuance of bonds."

The Council recently defeated a bill to purchase the railway on the terms offered by the receivers.

CLEVELAND TERMINAL AND SUBURBAN FRANCHISES GRANTED

The City Council at Cleveland, Ohio, took favorable action on the evening of July 12 on the franchises asked by the Cleveland, Akron & Canton Terminal Railroad and the Cleveland & Youngstown Railroad.

Under the franchise of the Cleveland, Akron & Canton Terminal Railroad the company is empowered to build an electrically operated, four-track subway under East Fifty-fifth Street from the lake to the southern city limits. The company is headed by Ohio C. Barber, Barberton, Ohio, well known throughout the country as the match king. The vote was twenty to five. As has been stated before, the franchise covers a period of seventy-five years. The minority members demanded a statement as to what interests were back of this proposition and demanded a bond guaranteeing that work would be begun on it within two years. Mr. Barber insisted, however, that his plans were all for the benefit of the city and if the people did not want the improvement he would abandon it before he would be tied down with conditions and requirements which he considered useless. Mayor Newton D. Baker supported Mr. Barber.

Under the franchise of the Cleveland & Youngstown Railroad, passed by a vote of nineteen to six, the company is empowered to establish a freight terminal near Broadway, S. E., about forty streets being vacated for the purpose. An amendment requiring that the terminal be operated by electricity was defeated, as were twelve other amendments proposed by the opponents of the measure. Councilman Bernstein insisted that action on the franchise be delayed until an agreement had been secured from the other railroads that they would build a new union station on the lake front. He also alleged that the New York Central Railroad was behind the company, although the attorneys for the New York Central had stated at the committee meetings that this was not so. The company was organized to build a rapid transit road for the entrance of both steam and electric railways to a point near the retail business district and to furnish service to a district on the hills southeast of Cleveland which is rapidly developing as a high-class residence section.

KANSAS CITY-CLAY COUNTY $1,500,000 VERDICT TO BE APPEALED

By gradual elimination the suits against the Kansas City, Clay County & St. Joseph Railway, operating between Kansas City and St. Joseph, Mo., and between Kansas City and Excelsior Springs, Mo., have been narrowed to one, that brought by the Interstate Railway for $2,000,000, in which a verdict for the plaintiff for $1,500,000 was awarded in the Jackson County Circuit Court on July 1, as noted in the ELECTRIC RAILWAY JOURNAL of July 10, page 78. Motion for a new trial in this case will be heard on Aug. 2. If the motion is denied, an appeal will be taken.

In the district north of Kansas City many different sets of options for the construction of interurban railways were secured at different times during the last twelve years. Most of the options were allowed to die, or were automatically extinguished by the failure of the companies to do the work required by law to the extent of 10 per cent of the capital stock in two years and completion of the road in ten years. It is alleged that only the Kansas City, Clay County & St. Joseph Railway had ever paid for rights-of-way, so that the present operating interurban is said by its owners to have the only effective rights to any options on its right-of-way.

Among projected interurbans in the district was the Kansas City-St. Joseph Electric Railway. This company secured options between St. Joseph and Kansas City, Mo., and did a small amount of work on the right-of-way above Dearborn. The line was to extend southward from St. Joseph to Kansas City. Another projected line was northbound from Kansas City to the north Missouri line, and some work was done on that right-of-way by the Interstate company. One of the earlier suits involving the right-of-way was brought by the Interstate company four years ago against the Missouri River & Camden Railway. This suit was dismissed without coming to trial. After the Kansas City, Clay County & St. Joseph Railway had begun operating, suit for $200,000 damages was brought against it by the Kansas City-St. Joseph Electric Railway on the charge that the defendant had taken possession and was using land on which it had active options. This suit involved the right-of-way southward from St. Joseph about half-way to Kansas City. Later the Interstate company brought suit for $2,000,000, making the same charge, this suit involving the right-of-way northward from Kansas City about half-way to St. Joseph. The Interstate case came to trial first. After the trial had begun, the suit of the Kansas City-St. Joseph Electric Railway was dismissed, and evidence was introduced in the Interstate case to show that the Kansas City-St. Joseph line had sold its rights to the Interstate company. This situation put the Interstate company in the position of having a presumptive series of options on the entire right-of-way of the Kansas City, Clay County & St. Joseph Railway between Kansas City and St. Joseph.

Ernest D. Martin, one of the plaintiffs and a promoter of the Interstate company, testified that he had renewed many of the original options with the consent of the property owners, while many of the property owners testified that they had never given their consent to such renewal.

The verdict for the flat sum of $1,500,000 was signed by nine jurors. Two jurors favored a smaller sum, and one held out for a verdict for the defendant.

Receivers have been appointed for the Kansas City, Clay County & St. Joseph Railway, as referred to elsewhere in this issue.

EMPLOYEES RAP ARBITRATION

Men Say Pleas of Company Impoverishment and Law of Supply and Demand Make Arbitration a Farce

At a meeting on July 7 of the joint conference board representing the sixteen divisions and 4200 employees of the Bay State Street Railway, Boston, Mass., it was decided that in future no arbitration proceedings would be agreed to by the men unless it was stipulated in advance that the factors of the company's financial condition and the "law of supply and demand" would be eliminated from all consideration in the proceedings. The following is the text of the resolution adopted:

"In the future no arbitration shall be held unless it is a fair arbitration. The Bay State Street Railway enjoys its franchise and the right to make money from the public, and except for the public it would not exist. The company is constantly reminding us of what we ourselves well know about the interest of the public in the operation of its cars. We realize that a failure to arbitrate and a strike might result in great inconvenience to hundreds of thousands of people, and a strike is not lightly undertaken. There never has been a strike on this system.

"The public should be reminded, however, that the company takes advantage of our recognition of the public interest by using against us in arbitration the law of supply and demand, and its financial condition. By agreeing to arbitrate we lose the only weapon we have to meet both these arguments, and unless they are both eliminated in the future we think arbitration, so far as we are concerned, will be a farce.

"After many years of hard work and the presentation of our claims concerning both these factors, many boards of arbitration have recognized the force of the argument that the law of supply and demand could only be invoked against us if we were given a fair chance to try it out, and as Chairman Storrow of the Boston Elevated Railway board of arbitration said, the only way in which it could be really tested would be to have a strike and see whether or not the company could at once secure the necessary number of competent men to prepare and operate its cars.

"If a street railway or other public service corporation was in the hands of a receiver because of its inability to pay interest on its bonds and people still wanted to ride,

no one would say that the wages of the men should be inadequate because of the financial condition of the company. We again call the attention of the public to the award of Chairman Storrow of the Elevated board of arbitration concerning finances, in which he agreed that the contention of the men should prevail and that the financial condition of the company should not be taken into account in fixing wages. The expense of a thorough financial investigation and the disadvantage at which we are placed in making such an inquiry are altogether too great to warrant us in again including it as a subject matter of consideration by a future board of arbitration."

ALBANY DIFFERENCES STILL UNSETTLED

On July 15 the question of jurisdiction between the unions on the lines of the Hudson Valley Railway and the United Traction Company, Albany, N. Y., remained unsettled. C. F. Hewitt, general manager United Traction Company, still insists that the conferences be open and that the newspaper men be permitted to attend them. He says that W. D. Mahon, president of the Amalgamated Association, who arrived in Albany on July 14, assured him at a conference in Detroit in May, at which Warren S. Stone, representing the steam brotherhood, was present, that the dispute between the Amalgamated and the Brotherhood as to who would operate the lines would be held in abeyance until the September convention of the Amalgamated association.

The men issued a statement in which they said their committees were explaining the situation to Mr. Mahon. They said that there are involved the working agreements of four divisions on the properties of the Hudson Valley Railway and the United Traction Company and grievances and complaints affecting the New York State Railways. President Horace E. Andrews of the New York State Railways is said to have expressed his willingness to take up at once the complaints affecting that company.

REFUSAL TO REOPEN BOSTON ARBITRATION

Classification Under Boston Elevated Award Must Stand Until May 1, 1916

James J. Storrow and his associates on the board of arbitration that settled the wage dispute between the Boston Elevated Railway and its union employees in 1913, have refused, in a decision handed down on July 8, to reopen questions in the original award over which a misunderstanding has come between the road and its men. The board was appealed to last December to interpret its rulings on classifications in the "L" shops. A difference of opinion had arisen as to whether or not men in a lower-paid class are entitled to the same rate of pay of a higher-paid class if they are doing the same character of work as men in the higher-paid class. In its conclusion the board, consisting of James J. Storrow, James L. Richards, representing the company, and James H. Vahey, representing the men, said:

"Whether the company intends to hold a deserving man back or not, this system, in our judgment, has this effect. We think that no large corporation can be gifted with the stock of wisdom needed to administer with justice such a highly complex system. There should be a reasonable number of gradations, but we find in general that the present number is excessive. We have therefore sought in fixing the new scale of wages substantially to reduce these classifications, as appears in the schedules which have been annexed.

" 'For example, we have reduced the classification of blacksmiths from twelve to six. But this has an important effect upon wages. The only way these excessive classifications can be reduced is to give some men more increase than others so as to level up the differences. If we gave every blacksmith 6 per cent increase in pay, there would still be the same twelve classes of blacksmiths.'

"If the union is now free to raise this question again by a further examination of the character of the work being performed by the men under the present classification, it can only be for the purpose, at least in effect, of further reducing the number of these classes, or at least accomplishing a substantial portion of this result by taking a substantial proportion of the men out of one class and putting them into a higher class than that determined for them by the board of arbitration.

"Our conclusion is that this whole question of classification was raised in the arbitration proceedings and definitely determined in the award resulting from these proceedings, and that the question cannot properly or fairly be reopened before the expiration of the period for which the original award was made effective, namely, not prior to May 1, 1916."

Mr. Vahey, who concurred with the decision of his colleagues, issued a statement setting forth his exact position in the controversy and lauded Mr. Storrow, asserting that the chairman was in no way to blame for the conditions which exist.

PROGRESS WITH TOLEDO TENTATIVE FRANCHISE

At a meeting of the franchise committee of the City Council of Toledo, Ohio, on July 9, Henry L. Doherty, chairman of the board of directors of the Toledo Railways & Light Company, expressed the belief that a clause should be inserted in the tentative draft of the franchise now in preparation that will allow the company to name its own rate of fare pending the fixing of a permanent rate at the end of the proposed try-out period, if the earnings should fall below 4 per cent. Councilman Dotson suggested that if a rate is not agreed upon within ninety days from the close of the period the matter should be submitted to a board of arbitrators or the courts. Mr. Doherty said that if the city insisted upon control of the operating rate, it should be responsible for any possible losses as the result of the establishment of a rate too low. The present draft provides that when the return on the investment falls to 4 per cent there is to be a readjustment of fares under the terms of the agreement.

The probable rerouting of cars and abandonment of any lines found to be unprofitable were also discussed at this conference. In regard to appraising the property, Mr. Doherty said that if three impartial men were selected an agreement could be reached with them without submitting the matter to a board of arbitration. The property should be valued as it now stands, with any betterments which are made added to this.

Mr. Doherty submitted an amendment to the clause relating to the municipal bond ordinance initiated and passed last August. Mr. Dotson insisted that nothing be placed in the draft to indicate that it supersedes the municipal ordinance. He also argued that all franchise values should be excluded from consideration in making an appraisal of the property.

Mr. Doherty objected to the transfer provisions of the draft, especially the portion relating to transfers on transfers. He said that he believed the people of Toledo wanted good service and good cars rather than low fare. The idea, then, would be to simplify the system so far as possible.

Frank R. Coates, president of the Toledo Railways & Light Company, and Rathbun Fuller, attorney for the company, were present at the conference, but there were few people in the lobby.

At a conference on the afternoon of July 14 between Henry M. Doherty and Messrs. Redd and Dotson of the special franchise committee of the Council, Mr. Doherty announced that if the committee insisted upon the company purchasing 20 per cent of the municipal railway bonds, in case the city should at any time conclude to purchase the property, there would be no need of negotiating further. Only a cash transaction can be considered. He also informed the members that the company was entitled to a full attendance of the members of the committee when the proposed franchise is discussed.

The provision of the franchise relating to the bonds is that they shall be taken at par and accrued interest. It is said by some that a better price should be secured for the bonds.

A tentative agreement was reached to the effect that the section of the draft which provided that "the city of Toledo by adopting this ordinance shall not waive any of its rights which it may have by virtue of the ordinance adopted on Aug. 4, 1914," be eliminated. This is the municipal ownership bond ordinance.

DIRECTORS APPROVE DETROIT SALE

At a meeting of the directors of the Detroit United Railway, Wednesday, July 14, the proposed purchase agreement covering the company's property within the one-fare zone was approved. This agreement provides that the city, if authorized by a 60 per cent vote of the electorate, shall assume operation of the city lines, the price to be fixed by the Circuit Court of Wayne County. The directors decided to submit the new proposition to the stockholders, and an adjourned meeting of the latter has been called for Aug. 2.

On July 14 J. C. Hutchins, president of the Detroit United Railway, sent a letter to the stockholders reviewing the purchase proposals. This he concluded as follows:

"After several weeks of negotiation, the following plan was approved, viz.:

"The city personally to assume the payment of outstanding mortgages up to the claimed limit of its power under the constitution and laws of the State of Michigan, viz.: 2 per cent of the assessed value of the taxable property within the city, which would amount to approximately $11,000,000, and the balance, up to the limit of the price that would be fixed by the Circuit Court, by the creation of a sinking fund out of the earnings of the property to be taken over by the city, and so arranged that with the amount personally assumed by the city, the mortgage indebtedness referred to, up to the limit of the price fixed by the court, shall be paid in 1932, when the company's consolidated mortgage indebtedness matures, and any excess in price above the amount of outstanding mortgage indebtedness is to be secured in the same way and be payable at the same time.

"The proposed contract, modified as to the method of fixing the price to be paid for the property and the method of securing the payment of this price, you will recognize is materially different from the proposal originally made and upon which many of the stockholders sent their proxies, and while these proxies by their terms are unlimited and would authorize their use in voting upon the final proposition now to be acted upon, the holders are unwilling to use such proxies until all the stockholders, and especially those who gave such proxies, are advised as to the contract that is to be finally acted upon.

"The proposed modified contract has been fully considered in all its aspects by our board of directors in connection with existing conditions, and it has approved of such contract and unhesitatingly recommends to the stockholders the approval of the same.

"An adjourned meeting of the stockholders will be held at the company's office in Detroit on Aug. 2, at 3.30 p. m. for the purpose of considering such modified contract, and unless in the meantime advised to the contrary by the stockholders who gave the proxies referred to, the holders will feel, after this notice, warranted in voting the stock covered by such proxies in approving such modified contract and authorizing the board of directors and officers of the company to take such further steps in the direction of having the same carried into effect as may be necessary or proper.

"The contract cannot become binding on the city until approved by 60 per cent of the voters of the city voting upon the proposition at an election to be called for that purpose."

STRIKE DECLARED IN RHODE ISLAND

A strike of the union employees at the Rhode Island Company, Providence, R. I., was declared at midnight on July 14. Questions at issue between the company and its men had been the subject of negotiations for some time past, and all of the requests of the men had either been waived, settled or agreed upon except the question of wages. This the committee representing the union had agreed to submit to arbitration. The break came over the arbitrary stand taken by the representatives of the men with respect to the method of choosing arbitrators to consider this question.

Some time ago the company suggested to the men that the old schedule of wages be restored. The committee representing the union suggested that the old agreement, which expired on June 1, 1915, be continued for a period of two years with an additional clause providing that the company should discharge from its service or suspend employees who were members of the association until all sums due to the association had been paid. This was agreed to by both sides, with the understanding that the wage question should be decided by arbitration.

The men in the service of the Rhode Island Company now receive 28½ cents an hour after three years' service. They asked for 35 cents an hour as a maximum scale. The wage for the first six months is 23 cents an hour. The men asked 30 cents for the first six months. They also desired to eliminate the present system of graded rates. They maintained that a man is efficient after the first year's service and that he should receive the maximum wage at the end of the first year.

Curtailed service was established by the company on all the main city lines on July 15, but it was announced that the service would be suspended after 7 o'clock. A few minor disturbances were reported on the first day. More than 2400 men are said to be affected by the strike order, which also extends to the employees of the power houses.

Completion of Electrification Celebrated.—The first electric train over the London & Port Stanley Railway, London, Ont., which has just been electrified, started from St. Thomas at 6.30 p. m. on June 30 to Port Stanley, carrying a number of guests from London and St. Thomas, invited by Sir Adam Beck to celebrate the opening of the road.

Northern White Cedar Association Outing.—On June 25 the Northern White Cedar Association began its annual mid-summer outing, the members departing in a special car via the Northern Pacific Railway from Minneapolis, Minn., for Beaudette, Minn. From Beaudette the party was conveyed by a fleet of six launches to a camp on Sabaskong Bay, Lake of the Woods, approximately 60 miles north. The party remained there for four days, making a number of exploration and inspection trips to points of interest.

No Decision in Old Dominion Case.—The judgment in favor of the Westinghouse Electric & Manufacturing Company against the Washington & Old Dominion Railway obtained in the Circuit Court of Loudon County, Va., was not set aside by the Supreme Court of Virginia as stated in the issue of the ELECTRIC RAILWAY JOURNAL of June 19. The action taken was simply the routine procedure of issuing a writ of error to review the decision of the lower court. The case was appealed by the railway company and will be heard by the Supreme Court of Appeals next fall.

New York Compensation Law Constitutional.—On July 13 the Court of Appeals of New York upheld the constitutionality of the workmen's compensation law on three questions raised in suits brought to make the test. Judge Nathan Miller wrote the opinion in the cases of Marie Jensen against the Southern Pacific Company, a Kentucky corporation, and of William Alfred Walker against the Clyde Steamship Company. In the Jensen case, which was for causing death, it was asserted by the company that the statute was not intended to apply to employment in interstate or foreign commerce. The awards were affirmed.

Fifty-Mile Canadian Line to Be Electrified.—Martin N. Todd, general manager of the Lake Erie & Northern Railway, Brantford, Ont., and president of the Galt, Preston & Hespeler Railway, has confirmed the report that the Lake Erie & Northern Railway is to be electrified for the whole fifty-two miles from Galt to Port Dover. Mr. Todd expects cars to be running on the Galt-Brantford line by October, and to Port Dover by November. It is likely that Hydroelectric power will be used with substations at Galt, Brantford and Simcoe. It is stated that the two lines will shortly be amalgamated, with through electric railway service ultimately from Berlin to Port Dover.

Bids for Rails, Ties, Ballast, and Track Accessories Wanted.—Bids for about 35,000 tons of open-hearth rails were opened on July 16 by the Public Service Commission for the First District of New York, and between that date and Aug. 4 bids will be received for about 3000 tons of rolled manganese rails, more than 1,000,000 tie plates, about 356,000 cu. yd. of broken stone ballast, and about 30,000,000 ft. of ties and timber. This material will be sufficient to equip about 230 miles of single track. The city-owned lines in the dual system cover about 260 miles of single track, but the track materials for about 30 miles in the Fourth Avenue subway in Brooklyn and the Centre Street loop subway in Manhattan have been purchased.

Action on Norfolk Franchise.—The joint committee of ten and the representatives of the Virginia Railway & Power Company have agreed upon the three franchises which will be submitted to the City Council of Norfolk, Va., for approval and passage. Three ordinances will be framed and submitted to the Council, perhaps during August. The provisions of the grants include six tickets for a quarter, to be sold in thirty places and on the cars after three years; universal transfers; school tickets with an age limit of twenty-one years; taxes at the rate of 1½ per cent on the gross earnings for three years and 2 per cent thereafter; the substitution of six tickets for a quarter for labor tickets on the Bay Shore Line, and service from 6 a. m. to midnight, with owl service when the business justifies.

New Haven Recovery Suit Dismissed.—A suit of minority stockholders to recover $102,000,000 from former and present directors of the New York, New Haven & Hartford Railroad, who were charged with responsibility for alleged improper expenditures of funds, was dismissed by the Supreme Court of Massachusetts on July 8. William G. Rockefeller, Lewis Cass Ledyard, James S. Elton and Charles S. Mellen were among the defendants. The decision, which was written by Chief Justice Pugg, said in part: "It is an implied condition of becoming a stockholder in a corporation that its general policy shall be determined by the holders of a majority of the stock and that disagreements as to its dominating policy and as to details of its management shall be settled by its stockholders, and recourse cannot be had to the courts to adjust differences of this sort. It is only from actual necessity, in order to prevent a failure of justice, that a suit in equity for the benefit of the corporation can be maintained by a stockholder."

Summer School of Scientific Management.—The Pennsylvania State College will conduct a summer school of scientific management during the two weeks beginning Aug. 9. This summer session is planned for the accommodation of works managers, superintendents, heads of cost, stores, purchasing, planning, and production departments, and members of such departments. The time is restricted to two weeks to meet the needs of employees whose vacation period is limited to that time. The mornings of the session will be devoted to lectures and discussions on industrial organization and scientific management under the leadership of Prof. Hugo Diemer, head of the department of industrial engineering at the Pennsylvania State College. The afternoons will be devoted to applied methods of scientific management under the direction of W. H. Tabor. The shops of the Pennsylvania State College have been especially provided with means for teaching and demonstrating applied methods of scientific management. The fee for the course is $15.

Perpetual Franchise Issue Before New York Constitutional Convention.—Two votes have already been taken by the New York Constitutional Convention committee on legislative powers, of which William Barnes is chairman, on a proposal to erect a constitutional prohibition against perpetual franchises. Both times the proposal has been defeated. The votes were taken in connection with a proposal presented by Seth Low, New York, at the request of the Citizens' Union. Mr. Barnes has appointed a sub-committee to draft an amendment to meet the sentiment in his own committee. The proposal of Mr. Low would prohibit municipal authorities from granting franchises in perpetuity. It would provide for indeterminate franchises, but would permit municipal authorities to resume control of the franchise on terms to be defined in the original grant. On July 14 William M. Ivins urged that in the recapture of franchises by municipalities provision should be made for paying the retiring corporation a fair return on the money expended in operation and sufficient compensation to make up for the loss of the franchise.

PROGRAM OF ASSOCIATION MEETING

Colorado Electric Light, Power & Railway Association

The thirteenth annual meeting of the Colorado Electric Light, Power & Railway Association will be held at Glenwood Springs, Col., on Sept. 23, 24 and 25.

Financial and Corporate

ANNUAL REPORT

Tennessee Railway, Power & Light Company

The combined statement of operations of the Tennessee Railway, Power & Light Company, Memphis, Tenn., for the calendar year 1914 (all power sales to distributing and railway companies controlled and other inter-company transactions being eliminated), is as follows:

Gross earnings	$3,762,387
Operating expenses and rentals	1,959,183
Net earnings	$1,803,204
Taxes	311,806
Net earnings after taxes	$1,491,398
Interest, etc.	1,094,420
Net income	$396,978
Dividends paid on stocks of constituent companies not owned	109,048
Balance	*$287,929

*Of this balance $1,628 accrues to stock of constituent companies not owned.

The constituent companies had accumulated earnings from May 1, 1912, to Jan. 1, 1914, of $210,610, which, added to the above balance for 1914, showed a total of $498,539 from which dividends on the preferred stock of the Tennessee Railway, Light & Power Company were paid on March 1 and June 1, 1914, amounting to $306,336, leaving a balance of $192,203. The two principal causes for the unsatisfactory showing for the year 1914 were first, the depression in business which particularly affected industrial centers like Nashville and Chattanooga and resulted in economy in the use of electric light and power and street railway service. The European war increased this depression and its bad effect on financial and industrial conditions prevented the closing of several large power contracts. Second, the worst drought experienced in Tennessee since 1904 (the previous low record year), reduced the amount of hydro-electric power available for sale and forced the company to operate its steam plants to a much larger extent than ordinarily necessary, thereby greatly increasing operating expenses. This drought was broken in December. The prospects for 1915 indicate an improvement in every way. The large construction work has been completed, and very little will be required for capital expenditures during the year.

The 1914 operating figures for the controlled Nashville Railway & Light Company and the Chattanooga Railway & Light Company are shown below:

	Nashville Railway & Light Co.	Chattanooga Railway & Light Co.
Gross earnings	$2,240,307	$1,085,096
Operating expenses	1,159,523	616,966
Net earnings	$1,080,784	$468,130
Taxes	194,209	82,757
Net earnings after taxes	$886,575	$385,373
Interest	499,670	339,408
Surplus	$386,905	$45,965
Passengers carried	43,673,934	16,384,356
Kilowatt-hours sold	25,214,365	12,567,439

NO PRESENT DIVIDEND FOR THIRD AVENUE

The stockholders of the Third Avenue Railway, New York, are not to have a dividend on their shares before September at the earliest unless the directors of the company go over the heads of their special committee. The company's earnings for the year ended June 30 were made public on July 14, and at the same time it was announced that the special committee had decided to drop its inquiry into the question of whether a dividend was advisable, leaving it for a full board to take up at their meeting in the autumn, when the pamphlet report will be ready.

For the fiscal year just ended the company's gross operating revenues were $10,885,768, an increase of $27,552. The operating expenses decreased $27,590, and taxes increased $3,922. There was an increase of $5,912 in non-operating income and interest charges, and the sinking

fund, etc., took $13,083 less, so that the net income amounted to $696,521, an increase of $70,215.

During the year the company spent for improvements a total of $1,009,931 not included in the income account. This was met by the net income for the year of $696,521, by a decrease of $62,416 in the balance of current cash, by $172,738 borrowed from the depreciation account, by $26,083 from the sale of obsolete property and by some other small adjustments.

The usual 2½ per cent semi-annual interest on the adjustment income bonds was voted at the meeting of the directors on July 14. It is payable on Oct. 1.

In a statement given out by President Whitridge, it was announced that the directors had decided to establish a system of pensions in connection with the employees' association.

REFEREE HOLDS COMPANY LIABLE

United Railways of St. Louis Liable for Claims Against Predecessor Company to Extent of $10,139,681 for Unpaid Subscriptions on Latter's Stock

A report filed in Judge Taylor's division of the Circuit Court by Referee Charles W. Bates upon the creditors' bill of J. Brooks Johnson against the United Railways of St. Louis and other stockholders in the St. Louis Transit Company, holds that the defendants are liable for judgments held against the transit company by the plaintiff, also for interest at the rate of 6 per cent since the judgments were rendered and court costs.

The defendants are declared to be liable individually to the extent of the difference between what they paid for stock of the St. Louis Transit Company and its par value, in satisfying the judgments, which were purchased by Johnson from persons who had won personal injury suits against the St. Louis Transit Company. These judgments originally aggregated $27,044, in addition to which the plaintiff seeks interest and court costs.

In setting forth the extent to which individual stockholders in the St. Louis Transit Company are liable, Referee Bates holds that only $41 was paid to the St. Louis Transit Company for each share of its stock, par value $100, thus leaving $59 per share unpaid. There is said to remain unpaid on the 171,859 shares of stock of the St. Louis Transit Company held by the United Railways of St. Louis, $10,139,681. In case the referee's report is approved by the lower court and upheld by the higher courts, the United Railways of St. Louis and other defendants would be obligated to pay only such claims as were found to be owing by the St. Louis Transit Company prior to its absorption by the United Railways. Attorneys for the United Railways have already filed a bill of exceptions.

COMPANY CLAIMS SURPLUS

United Railroads of San Francisco in Application for Rehearing Denies Allegations of Commission and Asserts Inability to Set Aside Improvement Funds

The United Railroads of San Francisco has filed an application with the California Railroad Commission for a rehearing of the case in which the commission ordered the company to set aside $550,000 a year from income for improving its system and in which it also directed the company to make certain changes in its system of accounting. This decision was abstracted in the ELECTRIC RAILWAY JOURNAL of May 22.

The company questions the jurisdiction of the commission, especially in the announcement that instead of a surplus the company has a deficit in its profit and loss account. It says:

"We do not understand that your board has authority to marshal liabilities, determine legal or equitable priorities or appropriate assets, or to redraft or reframe the company's books of account so as to show a deficit when we earnestly and honestly believe, and have been so advised by counsel and accountants, that this company was within the law when it reduced its capital stock, compromised doubtful claims, reduced its liabilities in the amount of money actually paid into the sinking fund and set up in a surplus account this money actually paid to the trustee, thus wiping out the deficit which your board has said exists."

The company goes on to say that it suffered a property loss in excess of $1,200,000 in the fire and earthquake, that it reduced its capital stock by this amount and its property account by $1,600,000, and charged the surplus with $1,200,000. The surplus was then credited with the net amount in excess of $400,000, and the result was that the capital stock and surplus were reduced $1,600,000 and the property account was reduced in like amount, which transactions the company believes correct from a legal and accounting point of view.

The company states that it will need its revenue from all sources for the payment of its operating expenses, taxes, sinking funds and interest, and that it will not be able to set aside $300,000 annually for three years, as ordered by the commission, as a special fund in bank to be used for extensions and additions. The company also declares that because of causes beyond its control which affect its revenues, it will not have the ability to set aside $45,833 a month within fifteen days after the first of each month following July 15.

MAINE COMMISSION REPORT

The sixth annual report of the Board of Railroad Commissioners of Maine contains returns from the fourteen electric railways in that State. The total mileage of street railways in operation on June 30, 1914, was 494.27 miles, an increase for the year of 9.18 miles. The gross assets of the several companies on that date were $33,661,037, while the gross liabilities and the capital stock totaled $32,869,742. The total amount of dividends declared during the year was $341,599, an increase of $113,122. The average dividend rate was 2.71 per cent. The combined reports of earnings for the year showed the following figures: Gross income, $3,744,069; operating expenses, $1,956,124; taxes, interest and other charges, $1,226,426; net income, $561,519; reserves and special charges, $123,815; dividends paid, $341,599, and surplus, $96,105. During the year eight persons were killed and eighty-four were injured.

NEBRASKA STATE RAILWAY COMMISSION

The seventh annual report of the Nebraska State Railway Commission for the year ended Nov. 30, 1914, contains the usual general review of the commission's activities during the year and the details of complaints, orders, decisions and reports made to and issued by the commission. The gross earnings from operation for all companies during the year amounted to $3,764,667, and the total operating expenses to $1,882,751, while the net income from operation was $1,907,589. Interest paid totaled $695,123; taxes, $293,865; dividends, $539,366; depreciation reserves, $294,605, and additions and betterments, $568,464. At the end of the year the surplus was $91,158. The total number of fare passengers was 68,234,000 and the total number of revenue car-miles run was 13,016,501.

Barcelona Traction, Light & Power Company, Barcelona, Spain.—The holders of the first mortgage fifty-year 5 per cent bonds of the Barcelona Traction, Light & Power Company at a recent meeting in June approved the proposed readjustment plan described in the ELECTRIC RAILWAY JOURNAL of Feb. 27 and May 1. A preliminary consent by the London holders was noted in the issue of May 29. H. F. Parshall, formerly chairman Central London Underground Railway, will have charge of operation, and E. R. Peacock, formerly vice-president Dominion Securities Corporation, Ltd., of financial arrangements.

Birmingham, Ensley & Bessemer Railroad, Birmingham, Ala.—The Cunningham independent bondholders committee of Boston in a recent circular stated that under an agreement dated June 14 between it and the New York committee of bondholders (C. H. Zender, chairman), the bonds deposited with the American Trust Company, Boston, have been redeposited with the Empire Trust Company, New York, depositary for the New York committee. This makes a total of about $2,500,000 of bonds deposited with the latter committee, which assumes the expenses incurred by the Cunningham committee in its investigation into the company's affairs. This action will not curtail the Cun-

ningham committee's desire for an accounting in case of a deficiency judgment in the foreclosure proceedings.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y.—On July 7 Justice Brown of the State Supreme Court appointed George Bullock receiver of the Buffalo & Lake Erie Traction Company in the foreclosure suit instituted by the New York Trust Company, mortgage trustee. C. K. Beekman, counsel for the bondholders' committee, stated that the appointment was necessary in order to finance certain betterments through the sale of receiver's certificates.

Columbus, Delaware & Marion Railway, Cincinnati, Ohio.—Judge Kinkead on July 3 refused to authorize the Columbus, Delaware & Marion Railway to issue $150,000 of receiver's certificates to meet obligations falling due on Aug. 1. He authorized the receiver, however, to execute notes for one year or less to pay expenses amounting to $55,000. The court instructed the receiver to pay interest on all bonds in order to enable the consolidated bondholders to take such steps within a reasonable time as they may wish to reorganize and lift the receivership.

Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo.—Judge Bird in the Jackson County Court on July 12 sustained the plea of the Interstate Railway for receivers for the Kansas City, Clay County & St. Joseph Railway and appointed Edward J. Corrigan and Bayliss Steele to act as such. The application was made to protect the judgment for $1,500,000 damages recently rendered the Interstate Railway for the taking of right-of-way on which it held options. This judgment is practically arrested pending action on motion for a new trial on Aug. 2. A more detailed explanation of the situation involving these companies is published on page 119 of this issue. On July 14, after an agreement between counsel, Judge Bird rescinded his appointment of Messrs. Corrigan and Steele and named I. D. Hook and J. G. L. Harvey as receivers. Mr. Hook is son of United States District Judge William C. Hook. The agreement reached covers the continuation of the regular operating force of the company.

Michigan United Railways, Jackson, Mich.—New York interests connected with the Michigan United Railways and the Commonwealth Power, Railway & Light Company deny that there is any truth in the rumor that they are preparing to make a bid for the Père Marquette Railway when it is sold at foreclosure next autumn, for the purpose of electrifying it and adding it to their system.

San Francisco (Cal.) Municipal Railways.—In May, 1915, the cash receipts of the San Francisco Municipal Railways from all sources were $185,707, which, less transfer deductions of $2,392 and operating expenses of $107,177, leaves a balance in favor of operation of $75,138. In June receipts are reported to have been $199,261. If the average for the first five days of July is maintained, the receipts for that month will amount to more than $225,000.

San Francisco-Oakland Terminal Railways, Oakland, Cal.—A recent circular issued by the San Francisco-Oakland Terminal Railways, explaining the default in the payment of interest coupons maturing during July, states that a committee of security holders has been organized for the purpose of studying the financial problems of the company, formulating plans for subserving the large values recognized by the California Railroad Commission and bringing about whatever readjustment may be necessary in order to put the finances of the company on a permanently sound basis. The committee has secured the co-operation of San Francisco and Oakland bankers, who have agreed to buy these interest coupons for the full face amount less the income tax. The Mercantile Trust Company, San Francisco, representing ten or twelve banks, has offered to purchase the coupons from the first consolidated thirty-year 5 per cent bonds, and also from all the other issues of the system accruing in July, provided the selling bondholders agree that the coupons shall be given prior rights under the several mortgages as against the principal of the bonds and any interest not yet matured.

Western New York & Pennsylvania Traction Company, Olean, N. Y.—W. R. Page, president Western New York & Pennsylvania Traction Company, and associates have taken an option on the line of the old Buffalo & Susquehanna Railway from Wellsville to Buffalo. If the option is exercised it will be done independently of the electric railway.

West Virginia Traction & Electric Company, Wheeling, W. Va.—On June 1 the West Virginia Traction & Electric Company issued and sold $1,500,000 of two-year 6 per cent gold notes, as stated in the ELECTRIC RAILWAY JOURNAL of June 9. Of these notes $1,250,000 has been used to purchase $1,250,000 of 5 per cent three-year convertible gold notes due on July 1. On this latter date the mortgage and deed of trust dated July 1, 1912, covering the first refunding and extension mortgage thirty-year gold bonds, dated July 1, 1912, and due on July 1, 1942, was cancelled and in its place there was created a mortgage and deed of trust dated July 1, 1915, under which there is a total authorized issue of $25,000,000 par value of first refunding and improvement mortgage thirty-year gold bonds dated July 1, 1915, and due on July 1, 1945. There has been issued and deposited as collateral for the $1,500,000 of two-year 6 per cent gold notes before mentioned $1,875,000 of these first refunding and improvement mortgage thirty-year gold bonds.

York (Pa.) Railways.—The directors of the York Railways have declared a dividend of 2½ per cent on the $1,600,000 of 5 per cent cumulative preferred stock for the half year ended Nov. 30, 1914, payable in cash on July 30 to holders of record on July 20. The previous dividend was paid in 5 per cent scrip.

DIVIDENDS DECLARED

Charlottesville & Albemarle Railway, Charlottesville, Va., semi-annual, 3½ per cent, preferred.

Denver & Northwestern Railway, Denver, Col., quarterly, one-half of 1 per cent.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis., quarterly, 1½ per cent, preferred.

New Hampshire Electric Railways, Haverhill, Mass., 2 per cent, preferred.

United Railways & Electric Company, Baltimore, Md., quarterly, 50 cents, common.

York (Pa.) Railways, $1.25, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
CLEVELAND, PAINESVILLE & EASTERN RAILROAD, WILLOUGHBY, OHIO					
1m., May, '15	$36,149	*$20,356	$15,793	$10,993	$4,800
1 " " '14	37,864	*19,771	18,093	11,068	7,025
5 " " '15	149,187	*89,483	59,704	54,772	4,932
5 " " '14	153,696	*86,268	67,428	54,858	12,570
GRAND RAPIDS (MICH.) RAILWAY					
1m., May, '15	$92,056	*$70,070	$21,986	$13,739	$8,247
1 " " '14	107,265	*70,215	37,050	13,344	23,706
12 " " '15	1,243,271	*834,955	408,316	162,557	245,759
12 " " '14	1,299,642	*831,997	467,645	159,828	307,817
HAGERSTOWN & FREDERICK RAILWAY, FREDERICK, MD.					
1m., May, '15	$36,782	$21,823	$14,959	$9,415	$5,544
1 " " '14	33,928	22,680	11,248	8,450	2,798
11 " " '15	398,284	232,819	165,465	103,159	62,306
11 " " '14	369,619	239,735	129,884	118,176	11,708
HUDSON & MANHATTAN RAILROAD, NEW YORK, N. Y.					
1m., May, '15	$462,256	*$194,341	$267,915	$211,767	$56,138
1 " " '14	473,462	*194,762	278,700	208,969	69,731
5 " " '15	2,324,164	*971,742	1,352,422	1,056,629	295,793
5 " " '14	2,384,930	*982,610	1,402,320	1,040,169	362,151
LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO					
1m., May, '15	$114,031	*$74,255	$39,776	$36,055	$3,721
1 " " '14	120,750	*76,599	44,143	35,322	8,821
5 " " '15	505,339	*356,430	148,909	179,927	†31,018
5 " " '14	530,903	*354,944	175,959	176,251	†292
NASHVILLE RAILWAY & LIGHT COMPANY, NASHVILLE, TENN.					
1m., May, '15	$175,513	*$107,102	$68,411	$42,248	$26,163
1 " " '14	192,144	*112,818	79,326	41,338	37,988
12 " " '15	2,199,969	*1,289,261	910,708	492,029	418,679
12 " " '14	2,236,642	*1,405,187	831,455	483,680	347,775
NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO					
1m., May, '15	$323,324	*$191,317	$132,007	$51,524	$80,483
1 " " '14	323,036	*191,808	131,228	50,660	80,568
5 " " '15	1,424,675	*900,768	523,907	255,962	267,945
5 " " '14	1,403,920	*860,110	543,810	250,815	292,995
PORTLAND (ME.) RAILROAD					
1m., May, '15	$84,316	*$55,932	$28,384	$22,877	$5,507
1 " " '14	86,427	*52,946	33,481	20,177	13,304
12 " " '15	1,046,804	*646,372	400,432	260,713	139,719
12 " " '14	1,046,716	*650,100	396,616	238,632	157,984
PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.					
1m., May, '15	$446,149	*$253,738	$192,411	$188,440	$3,971
1 " " '14	538,473	*287,288	251,185	183,643	67,542
12 " " '15	5,794,271	*3,149,446	2,644,825	2,207,287	437,538
12 " " '14	6,739,779	*3,353,244	3,386,535	2,103,753	1,282,782

*Includes taxes. †Deficit.

Traffic and Transportation

THE JITNEY BUS

California Supreme Court Upholds San Francisco Ordinance Ruling—Georgia Commission's Plan for Regulation

The San Francisco jitney bus ordinance has been declared valid by the Supreme Court of California. The matter was brought before the court by a writ of habeas corpus issued in behalf of Paul Cardinal, a jitney bus driver, arrested in May and charged with violating those provisions of the measure which require a bus driver to qualify in a bond or insurance in the sum of $10,000 and also pay a license fee. The court dismissed the writ and remanded Cardinal into custody. In his writ Cardinal, through his attorney, attacked the ordinance on the ground that it was discriminatory in that it attempted to regulate by bond and other requirements an automobile driver who charged no more than 10 cents fare. The Supreme Court holds that the ordinance is a reasonable exercise of the police power vested in cities for the protection of citizens and that laws made by virtue of such power are not to be set aside by courts unless they are found to be unreasonable and unjust. The court sees no unjust discrimination in the not-more-than-10-cents-fare classification for the reason that such low fare puts the jitney driver in competition with the street car and tempts him to run at a high rate of speed to make his profit. It holds that the jitney business is one which, if negligently conducted, would be fraught with danger to passengers in the jitney buses and to persons in the public streets, and therefore particularly subject to special regulation.

The injunction sought by associated jitney-bus operators in Atlanta to restrain the Georgia Railroad Commission from proceeding further with its announced program of prescribing rules and regulations for the buses as common carriers was denied on July 10 by Judge W. D. Ellis of the Fulton Superior Court. No arguments were heard, the court having before it the petition of the jitney-bus operators and the answer of the Railroad Commission. The latter's position was that it had applied no rules, those which had been published being merely tentative and subject to discussion and permanent order at the hearing set for July 13 by the commission. The jitney-bus men indicated they would appeal to the Supreme Court from the decision of Judge Ellis, and the latter therefore granted a supersedeas allowing twenty days for such action to be taken. The commission's announced hearing, set originally for July 13, is stayed meanwhile. Some weeks ago Judge Ellis denied the jitney-bus men's petition to enjoin the city of Atlanta from enforcing its ordinance taxing them and regulating them under its police powers. This has been argued on appeal in the State Supreme Court.

Offering to establish auto-bus lines in East Bakersfield, Cal., and for Beale Park, A. G. Wishon, general manager of the San Joaquin Light & Power Company, appeared before the City Council of Bakersfield, Cal., urging that some action should be taken toward the elimination of jitney bus competition with the electric railway. He suggested that the jitney lines, as well as the auto-bus lines, to be placed in service by the street railroad, should be regulated, placed on certain routes and the public be given guarantees of service. In East Bakersfield he proposed that the street railroad bus lines should serve Baker and Niles Streets, making schedules so that connections would be made with the street cars. Transfers would be issued from the street cars to the auto-buses and vice versa, making a 5-cent fare over the entire route, the city's autos to run as late as the cars operated. In the Beale Park district it was proposed that the auto-bus service connect with every other car.

Andrew Linn Bostwick, librarian of the municipal reference branch of the St. Louis library, has devoted the July issue of the St. Louis Public Library *Monthly Bulletin* to the subject: "The Regulation of the Jitney Bus—A Discussion of City Ordinances." The publication is a welcome addition to the growing list of pamphlets which have as their major purpose the recording of the rise and regulation of the jitney.

The Mayor of Charleston, W. Va., has signed the ordinance passed by the Council of that city to regulate the jitney. The license fee is fixed at $24 for each machine. The jitney is described in the ordinance as a vehicle which carries passengers for hire at less than 10 cents each. The bond is fixed at $2,500 for each car.

Jitney buses will be declared common carriers and placed under State regulation if a bill introduced by the committee on corporations in the Wisconsin Senate becomes a law. The bill provides that jitney owners must file with the State Railroad Commission a schedule of their rates, service, and routes, and if they are approved by that body, and on the filing of a bond of $5,000 for payment of damages for personal injuries to passengers, the jitney men shall be entitled to permits to operate, subject to the supervision of State regulating authorities.

In applying to court for an injunction to restrain the enforcement of the jitney ordinance enacted in Pottsville, Pa., the owners contended that compliance was impossible. The ordinance requires jitney owners to get a certificate of public convenience, but the Public Service Commission has notified them that it will not issue such certificates at present, as the statewide regulation of jitneys is a matter which will be taken up with great care. The ordinance imposes a tax of $100 on each vehicle between Pottsville and Schuylkill Haven, which is claimed to be excessive. Decision was reserved.

The Board of Aldermen of Hartford, Conn., on July 19 will consider the jitney regulatory ordinance drawn up by the ordinance and police committee. The measure provides for the licensing of jitney operators by the chief of police at $10 each for one year, revocable for failure to comply with the provisions of the ordinance. Not more than two passengers in excess of the seating capacity are to be carried. The routes must be conspicuously posted on the machines. The tentative draft does not contain any bond regulation.

The Bristol (Tenn.) Traction Company is planning to install several motor-buses to traverse the principal residence streets not on the lines of the company, gather up passengers and transfer them to the regular cars, at the usual fare.

By furnishing one bond covering thirty-two jitneys, a local jitney association at Louisville, Ky., has complied with the terms of the law and is preparing to put that number of cars in operation, it is stated.

Councilman T. H. Bolton of Seattle has prepared a jitney ordinance which would require a city license or permit for each jitney driver, compel jitney operators to follow certain routes during certain hours of the day and night, make it unlawful to charge a higher fare than that specified in the ordinance and designate points at which passengers may be loaded and unloaded.

Officials of the Tacoma Jitney Bus Association have sworn out warrants for the arrest of fifteen automobile drivers who carried passengers for charge to the race track during the recent automobile races held in that city on July 3, 4 and 5. The warrants charge the drivers with operating without licenses. The prosecuting attorney's office announced that warrants would be issued for approximately thirty Seattle drivers, who operated motor trucks to the Tacoma speedway on the dates named, without a State license to carry passengers. The State law fixes the maximum penalty of $500 for each passenger carried in cases of such violations.

Motor-buses operating at a fare of 3½ cents have been introduced on North Monroe Street, Spokane, Wash., by the Green Security Company, which has five ten-passenger machines in service. J. W. Green, president of the company, promises a 2½-cent fare for North Monroe Street in the next few weeks, when two new forty-two-passenger cars and two thirty-one-passenger cars are delivered from St. Louis. Mr. Green is quoted as follows: "We began to issue books of 100 tickets for our first auto-buses at $3.50, thus reducing the fares purchased in this lot to 3½ cents. For those who do not care to invest in 100-book ticket we have another special rate ticket of twenty-five for $1. I wish to deny that the Green Security Company is being backed by the Washington Water Power Company, which operates the local electric railways."

COMMISSION SUBSERVIENT TO LEGISLATURE

New York Commission Lacks Power to Increase Rates Beyond Legislative Maximum

Refusing to permit the Ulster & Delaware Railroad to increase its mileage book rate from 2 to 3 cents a mile the Public Service Commission for the Second District of New York City on July 7 made one of the most important statements of principle since the passage of the public service commissions law in 1907. The majority of the commission holds that notwithstanding the broad rate-making powers granted by the Hughes statute and its subsequent amendments, the commission has not the power to permit a rate to be increased above a maximum set by the Legislature. Chairman Van Santvoord in the prevailing opinion, concurred in by Commissioners Hodson and Irvine, points out that should the commission assume that the power to permit such increases had been delegated to it by the passage of the public service commission law, not only the mileage-book law involved in the present case but such other statutes as the 3-cent maximum fare law, possibly even the 80-cent gas law for New York City, and other similar enactment might be in effect repealed by the commission's decisions. In an extended review of all the statutory sections involved he fails to find that the commission, either expressly or impliedly, has been granted such power.

Commissioner Emmet and Commissioner Carr dissent. Mr. Emmet holds that had not the Legislature intended to take the rate-making power out of the "often bungling" hands of the Legislature and place it for expert determination absolutely in the jurisdiction of the commission the whole battle of Governor Hughes for the regulation of public utilities would have been vain. As the power to lower rates irrespective of legislative enactment is expressly granted in the public service commissions law, Mr. Emmet finds that the power to raise rates is implied beyond reasonable doubt. Were this power to raise rates to afford a reasonable return on investment in accordance with the facts disclosed in each case not implied, Mr. Emmet holds that the intent of Governor Hughes and the Legislature which passed the law would have been anything but the distribution of even-handed justice, to the railroads as well as to the public.

The Supreme Court of Missouri, as quoted in the opinion of Commissioner Carr, has held that the Public Utility Commission of that State, by a statute delegating to it the rate-making power in the same words as does the Hughes law, was empowered to set aside the 2-cent fare law of that State. He holds that the mileage-book law of New York State is in effect but a legislative guide for the railroads which come under it until the rate which it prescribes can be passed upon by the Public Service Commission.

The mileage-book law was passed in 1895 and the commission holds that it was not repealed when the public service commissions law was enacted in 1907. On the contrary, it is pointed out that when the consolidated laws were enacted in 1910 the public service commissions law was made chapter 48 of the consolidated laws and the mileage-book law in its then precise form was made chapter 49 of the consolidated laws, the chapter numbers at least indicating that the mileage-book law, re-enacted thus subsequently to the public service commissions law, specifically escaped the effect of the clause in the public service commissions law repealing all other statutes contrary to itself.

The mileage-book law provides that wherever a railroad more than 100 miles in length sells regular tickets for more than 2 cents a mile up to the legal maximum of 3 cents a mile it must sell a mileage book at 2 cents a mile. The Ulster & Delaware Railroad pleaded that this was not a rate on which it could earn a fair return within the law and asked for permission to increase the rate to 3 cents a mile under the general rate-making powers of the commission. It was opposed by the State Council of the United Commercial Travelers and by the municipal authorities and civic bodies along the lines of the road. While the majority opinion seems to concur with the dissenting one in that the railroad on a basis of fair return is entitled to an increase and admits that in such a case the commission has a power to grant an increase, it holds that this power to increase does not extend to increases above a statutory maximum.

The direct question as to whether the commission has the power to raise rates in contravention of these older statutes has never been raised in New York State before, and the decision of the commission will undoubtedly be carried to the court of last resort for final determination. Not only the Ulster & Delaware Railroad but every railroad company in the State whose lines are more than 100 miles long and which has been incorporated since the passage of the mileage-book law or which has since that date been formed by consolidation of previously organized corporations and sells regular tickets for more than 2 cents a mile is now limited to 2 cents a mile for its mileage rate.

THIRTEEN KILLED IN GORGE

Of Eighty-four Passengers on Derailed Car Not One Escaped Injury

On the evening of July 8 a double-truck open car of the International Railway, Buffalo, N. Y., crowded with passengers, most of whom were women and children, skidded over the slippery rails in a heavy rain storm and dashed down the steep incline near the foot of the grade from Brock's monument overlooking the lower gorge of the Niagara to the boat landing at Queenstown, Ont., and after jumping the rails crashed into a tree and telegraph pole and partly overturned.

Of the eighty-four passengers on the car none escaped injury. Thirteen were killed and more than threescore were so badly injured that it is expected some will die. The accident was one of those unavoidable affairs caused partly by the weather and partly to the mad rush of the excursion party to board the car which was the first of four to leave the monument, thus greatly overcrowding the trolley despite the efforts of the crew who urged a number to take the three following cars down the steep incline through the lower end of the gorge. Every effort was made by the motorman to keep the overloaded car under control. Preliminary investigations by the Dominion government and by representatives of the railway company show that the brakes were securely set; that the power had been reversed and that every effort was made by the motorman to stop the trolley from skidding over the slippery rails caused by the rain storm.

The passengers were members of two Toronto, Ont., Sunday school excursion parties who had spent the day in the grove in the vicinity of the monument overlooking the great gorge of the Niagara. The boat on which they were to cross Lake Ontario from Queenstown was to leave at 7.15 o'clock in the evening. Four cars were sent to the monument from the Whirlpool carhouse and the first car left the monument for the return trip at 6.40 o'clock, twenty-five minutes before the boat was scheduled to clear. It had been raining and the entire party tried to board the first car for the boat. The car was of the large open type with fourteen cross-seats, with a seating capacity of five on each seat, and with a running board on the river side of the car. Every seat was taken and the passengers crowded into the available standing room between the seats, while some stood on the running board despite the efforts of the car crew to persuade them to wait for the other three cars which were to follow within a few minutes.

The car was started while passengers were still trying to climb aboard. It was kept under control from the monument down to the Lewiston Bridge spanning the river between Queenstown, Ont., and Lewiston, N. Y., and here it was brought to a stop to allow the conductor to throw a switch leading from the main line to a spur track running along the Canadian side of the river to the boat landing. The worst of the grade had been covered up to this point. After turning the switch the conductor collected the remainder of the fares and gave the motorman the signal to proceed.

From this point the car gained momentum, and despite the efforts of the motorman to check the speed the car skidded, entered the last curve, which is a right-angle turn, and jumping the rails, crashed into a tree, which knocked every support from under the roof on one side of the car, and then struck a pole and partly overturned.

As soon as the car left the rails the conductor jumped. He hurried to Queenstown about an eighth of a mile away

and summoned aid. The roof collapsed on the passengers. Of the thirteen who died many were killed outright. The others died while being removed to the hospitals at Niagara Falls, Ont., and Toronto, Ont.

Investigation showed that both trucks left the rails; that the brakes worked and held the wheels; that the sand box was half full of sand; that the controller was reversed; that the car skidded over the slippery rails at a great speed before it struck the sharp curve which sent it into the air and toppled it over into the ditch. The grade from the monument down to the point where the car stopped so as to allow the conductor to turn the switch is much greater than at the point where the accident occurred.

Officials say this is another bit of evidence that shows the value of controlled entrance and exit cars. The car crew was powerless to check the mad rush of the excursion party to board the car. It is pointed out that if the car had been of the new controlled-entrance type, only as many passengers as could be seated would have been allowed aboard. This would have prevented overcrowding and the car might have been kept under control.

This is the first accident of a serious nature on the gorge line in years. The line from Niagara Falls, Ont., to Queenstown along the Canadian river bank is owned by the International Railway, and while operated as a part of the Great Gorge Route Company is not owned by the latter, which operates and owns the line through the American Gorge. The accident was not on the gorge route, but on a spur track leading from the main line to a boat landing. The rails and ballast were found intact after the disaster.

WASHINGTON BUS REFUSED INCREASE IN FARES

The Metropolitan Coach Company, now in the hands of a receiver, applied recently to the Public Utilities Commission of the District of Columbia for permission to increase its rate of fare from the present rate of six tickets for 25 cents to a flat rate of 5 cents per ride, contending, among other things, that it was unable to continue to furnish service under the present rate of fare. An investigation was made and a formal hearing was held on May 20. At the hearing the representative of the Metropolitan Coach Company reiterated the request, and referred the commission to the annual reports of the company for information concerning its finances. No objection to the increase in fare was made at the hearing, nor has any written protest been received. The company owns no unincumbered real property, and such expenditures as it has made for garage and plant facilities have been made upon leased land. The company owns six coaches, the cost price of which was $3,749 each, making a total cost price of $22,494. There is a balance still due thereon of $2,894. The commission estimated the fair value of the property of the company at $11,000. In its opinion the commission said:

"Since the company, during a large part of the calendar year 1914, was operating over a longer route than at present, and was operating four large buses which have since been disposed of, the operating conditions of the company for 1913 approximate more nearly to the present conditions than do those for the year 1914, and therefore the report of the company for the year 1913 is selected for purposes of comparison. The net operating revenue for that year was $1,080. Assuming that the revenue passengers will number the same as in 1913, the annual revenue will be increased by $4,172 over that year by an increase of fare to 5 cents, and assuming that the operating expenses will remain the same as in 1913, the annual net operating revenue will be $5,252.

"Assuming the life of the coaches to be six years, the company should be setting aside annually for depreciation $3,750, and, assuming yearly taxes at 1½ per cent on a valuation of $11,000, the company should provide $165 annually for taxes. This total annual charge of $3,915, with a net operating revenue of $1,080 when operating under the conditions for the year 1913, would leave a deficit of $2,834, but with a net operating revenue of $5,252 when operating under the same conditions except for an increase of fare to 5 cents, it would leave a gross income less operating expenses and taxes of $1,337. However, the service furnished by the company is unsatisfactory. There are not enough coaches to handle the traffic, the condition of the present coaches is poor, and the schedules filed with the commission by the company are not being regularly maintained. These conditions have been repeatedly brought to the attention of the company. In view of these facts, the commission is of the opinion that while a 5-cent flat rate of fare would be just and reasonable if reasonably satisfactory service were furnished by the company, it is not justified under the present conditions."

The commission has denied the petition of the company to increase its rate of fare to a flat rate of 5 cents and has announced that it will give further consideration to a petition for an increase in fare after reasonably satisfactory service has been established by the company.

EFFECT OF LOW FARES AT VANCOUVER

As announced in the ELECTRIC RAILWAY JOURNAL for May 15, the British Columbia Electric Railway inaugurated on May 10 an eight-tickets-for-25-cents rate for non-transfer rides in Vancouver and Victoria. This reduction from the 5-cent fare, made primarily on account of jitney competition, resulted by the following month in an increase of 25 per cent in Vancouver passenger travel and 3 per cent in revenue. At the same time the revenue per car-mile has remained practically stationary. The principal travel area of Vancouver is a 3-mile zone around the center of the city.

On May 17 the company also inaugurated a reduction of interurban fares on its lines between Vancouver and Westminster by changing the round-trip rate from 50 cents to 35 cents. The routes vary in length from 12 miles to 17 miles, so that the fare is practically 1 cent per mile. The reduction in this case produced a large increase of through travel, the increase in passengers being 9 per cent and in revenue about 20 per cent. The increased travel in both cases has been at the expense of competing jitneys.

SAN FRANCISCO INJUNCTION INOPERATIVE

An injunction against the Municipal Railways, San Francisco, Cal., was issued on July 6, as reported in the ELECTRIC RAILWAY JOURNAL of July 10, page 76, to prevent the city from operating cars running direct to the exposition over the lower Market Street tracks. The city, however, secured a twenty-four-hour stay of the injunction, and later a further delay of two days and a reassignment of the case to another judge. This means that the cars will continue to handle the exposition traffic until there are further developments. Meantime city officials are trying to establish the right of the municipal lines to the business that will be lost if the injunction is served. Thomas A. Cashin, superintendent of the Municipal Railways, has estimated that the exposition traffic over the municipal lines will be cut 50 per cent if the direct cars from the ferry have to be taken off. On this basis the loss would be about $150,000 per annum. On the strength of this estimate the bond of the United Railroads was fixed at $110,000.

REGULATION OF JITNEY ASKED IN INDIANA

A petition and brief was filed on July 13 with the Public Service Commission of Indiana by the Terre Haute, Indianapolis & Eastern Traction Company, seeking to require that the operation of jitney buses in the State of Indiana shall be subject to the regulation of the Public Service Commission as in the case of other common carriers, and that the owners of such vehicles shall be compelled to obtain franchises to operate them as common carriers. While the petition of the company specifically refers to conditions in Terre Haute, Ind., where it operates the city lines as part of its system, and where the competition of the jitney buses has become quite a factor, the request is made that the order of the commission shall cover every city in the State.

The company, through its attorneys, sets forth that the owners of jitney buses have held themselves out to the public as common carriers, and with this understanding solicit business on the basis of transporting passengers from one place to another within the city for a 5-cent fare. The same points are also reached by the cars of the traction company. The company says that the owners of the jitney buses are obtaining without any regulation or license the business for which the company is compelled to maintain expensive lines of street railroad. The owners of

such automobiles operate only at times when profitable, and thus are not required to maintain service at a loss as is the traction company. They are thus depriving the company of legitimate revenue which is needed to pay the expenses of improving the right-of-way of the company. This expense in Terre Haute amounted to $150,000 for the past two years, and taxes amounted to approximately $30,000 per annum. The fact that jitney buses as common carriers do not provide a flagman to protect the automobiles at railroad crossings is mentioned in the petition.

The Public Service Commission has appointed July 22 as the date when a hearing will be held in the Senate chamber of the State capitol at Indianapolis on the matter of regulation of jitney buses by the commission.

INCREASE IN FARE ALLOWED

The increase in the interurban fares of the Idaho Traction Company beyond Randall on the southern division and Collister on the northern division has been allowed by the Public Utilities Commission of Idaho in a decision just handed down. The commission, however, has refused to permit an increase in the fares on the Hill Crest loop and Collister and Cole school lines, has refused to permit an increase in the price of commutation tickets, and has refused to allow an increase in the 1-cent a mile fare charged on school children's tickets.

The commission based its opinion and order on the book valuations of the company. The total valuation of the properties of the company is shown by the commission from the books to be $2,640,285. This includes 85.54 miles of road, all terminals, stations, equipment, paving, etc.; also the Pierce Park and Natatorium properties. The total operating revenue, including $7,940 net earnings from the Natatorium, amounted to $366,984 for last year. The total operating expense amounted to $267,370 and the net revenue to $99,614. This does not provide any allowance for depreciation, which, the commission says, should be about $30,000. The earnings of the company for the year, not counting depreciation, amounts to less than 4 per cent. By making the allowance for depreciation and calculating the earnings as permitted under the order, the net will be a little better than 4 per cent. The commission some time ago granted a reduction in the power rate to be charged the company by the Electric Investment Company. This will result in a saving of about $14,000 additional.

Taking the present one-way rates within the 5, 10, 15, 20-cent, and other limits, the following increases are allowed: 25 cents one way, now 45 cents round trip; 30 cents one way, now 55 cents round trip; 40 cents, now 75 cents; 45 cents, now 85 cents; 50 cents, now 90 cents; 55 cents, now $1; 60 cents, now $1.05; 65 cents, now $1.15; 70 cents, now $1.35; 80 cents, now $1.45; 85 cents, now $1.50. The first figure named in each instance is the fare charged one way. The figure named in the second instance is the round-trip fare to be charged under the increase.

TENNESSEE JITNEY DECISION APPEALED

The city of Memphis has appealed from the decision of Judge A. B. Pittman of the Third Division of the Circuit Court in the jitney case, mentioned on page 41 of the issue of July 3. The case will probably be heard by the Supreme Court of Tennessee early next September. The case came before the Circuit Court through a writ of habeas corpus, charging unconstitutionality of the act on jitneys for the violation of which the relator, S. B. Ryals, was held in restraint of his liberty. Judge Pittman declared unconstitutional Sec. 3 of the act, which required a bond of not less than $5,000 for every jitney car operated. He did not pass on Secs. 1 and 2 of the act, which declared the jitneys to be common carriers and made it illegal for them to operate until they had been licensed by the city authorities and which also empowered the city authorities to fix the terms and conditions upon which jitneys may operate.

Uniformity in Car Operation Desired.—The City Council at Cleveland, Ohio, has adopted resolutions providing for the appointment of a committee to investigate the manner and method of payment of fares on the city railway lines and the manner and method of entering and leaving the cars. The idea of Council is to establish uniform methods in both particulars.

Car Capacity Order Rescinded.—The Health Department of New York has officially suspended the operation of its order limiting the number of passengers on the cars of the Third Avenue, the Flatbush-Seventh Avenue, the Smith Street, the Graham Avenue and the Gates Avenue lines of the Brooklyn Rapid Transit Company. The order of the board fixed the maximum carrying capacity of the cars at one and one-half times their seating capacity.

Cincinnati Service Crippled by Storm.—Street car and interurban railway service in Cincinnati, Ohio, and near-by towns in both Ohio and Kentucky was crippled for hours by the heavy wind and rain storm which passed over that section on the evening of July 7. No great damage was done to the properties of the Cincinnati Traction Company and the Cincinnati, Newport & Covington Street Railway, but the streets were strewn with debris from unroofed and wrecked houses and buildings, rendering it impossible for the cars to make their way safely over the lines until the tracks could be cleared. Interurban lines were tied up for a time for the same reason.

Efficiency Awards of $23,269 in Washington.—Following a custom inaugurated by the Capital Traction Company, Washington, D. C., seven years ago, $23,269.50 was distributed recently among 196 motormen and 160 conductors who, for the year ended June 30, have lived up to the regulations of the company and had records for efficiency that entitled them to share in the benefits of the generosity of the company. Sixty motormen and twenty-five conductors, who have served the company ten years or longer, were each presented with $100. Fifty-five motormen and thirty-three conductors, five years in the employ of the company, received $75 each. Fifty-three motormen and sixty-five conductors, who came in the two-year class, received $50 each, and twenty-eight motormen and thirty-seven conductors, who have been on the merit roll for a year, were awarded sums varying from $27.08 to $47.88. Since the merit system was started by the Capital Traction Company, in 1909, $139,610 has been distributed among the conductors and motormen as an award for faithful and efficient service.

Free Transportation in Manila.—The question as to whether members of the city police force of Manila, P. I., are entitled to free transportation on the lines of the street railway has been the cause of a recent controversy between the Manila Electric Railroad & Light Company and the city of Manila, according to a newspaper dispatch dated June 5. It appears that the company insists on the collection from the city of $1,150 alleged to be due as the result of the illegal enjoyment by policemen of free rides on the company's cars between Sept. 15, 1914, and April 15, 1915. A decision of the Supreme Court is said to have made compulsory the conspicuous display by policemen of their badges of office in order to be entitled to free transportation on the cars. The company contends that this ruling was not complied with during the period named and that in consequence it lost in uncollected fares the amount demanded from the city. On the other hand the city is suing the company for $21,000 for fares paid by police officers the last eight years, during which period it is claimed they were entitled to free transportation.

Union Men Sign Lexington Participation Plan.—Several concessions made by the Kentucky Traction & Terminal Company, Lexington, Ky., to its union trainmen have resulted in their signing virtually the same three-year contract as that already signed by the non-union trainmen individually. The union's demand for a closed shop was rejected absolutely by the company, and the open shop principle, now in force, will be continued. The union men, however, may wear their union buttons, a privilege denied under the former contract, and may maintain a bulletin board at headquarters. The shopmen receive a flat increase of 1 cent an hour. Wages of the trainmen, union and non-union, will be governed by the condition of the contract heretofore described in the ELECTRIC RAILWAY JOURNAL, by which the company sets aside a fixed percentage of its earnings to pay damage claims, the residue to be divided among the men as an increase, in addition to a 1-cent general increase effective on July 15 with the new contract. The company has agreed to provide the men with seats.

Personal Mention

Mr. E. Burt Fenton has been appointed manager of a new publicity department for the various properties operated by W. S. Barstow & Company, New York.

Mr. G. S. Henry has resigned as general superintendent of the Chicago & Milwaukee Electric Railroad, Highwood, Ill. A successor to fill this vacancy has not been appointed.

Mr. William M. Guy, who recently accepted the appointment of general traffic manager of the London & Port Stanley Railway, London, Ont., electrification of which has just been completed, tendered his resignation on July 3 to return to the service of the Pere Marquette Railroad, for which he has been chief clerk in London for years.

Mr. Irving M. Frost, for three years a director of the Rutland Railway, Light & Power Company, general manager of this concern, and also general manager of the Western Vermont Power & Light Company and the Pittsford Power Company, has forwarded his resignation to W. S. Barstow & Company of New York City, corporate managers of these companies.

Mr. G. R. G. Conway has resigned as chief engineer of the British Columbia Electric Railway, Vancouver, B. C., to enter consulting engineering practice in the East. He was honored at an elaborate farewell banquet at the Hotel Vancouver on June 28, tendered by the company, and highly complimented in a cablegram from the board of directors in London, England. He will continue relations with the company as its consulting engineer.

Mr. John F. Trumbull, formerly chief clerk to the chief engineer of the New York, New Haven & Hartford Railroad, has been appointed chief engineer of the Public Utilities Commission of Connecticut, succeeding Mr. C. C. Elwell, who resigned several months ago to become a member of the commission. Mr. Trumbull was graduated from Sheffield Scientific School, Yale University, in 1902, and has engaged continuously since that time in railroad work on the forces of the International Railroad of Mexico, those of the Connecticut Company and the New York, New Haven & Hartford Railroad.

Mr. James Dewar Fraser, secretary-treasurer of the Ottawa (Ont.) Electric Railway, was elected president of the Canadian Electric Railway Association at the annual meeting of the association held in Quebec on June 21 and 22. Mr. Fraser is a son of the late Andrew Fraser, of Martintown, Glengarry. He spent his youth in Glengarry and entered the employ of W. McClymont & Company, Ottawa, lumber dealers, in 1871, as an accountant and a telegraph operator. He remained with this company until 1882. He was then appointed secretary-treasurer of the Ottawa City Passenger Railway and continued in that position until 1891, when the company was merged with the Ottawa Electric Street Railway as the Ottawa Electric Railway. He has been secretary-treasurer of the company ever since and in 1913 was elected a director of the company. He is also an officer of the Ottawa Car Company, Ltd., and the Wallace Realty Company, Ltd.

J. D. FRASER

OBITUARY

O. W. Jasper, Sr., one of the engineers engaged in the construction of the Northern Electric Railway, Chico, Cal., died recently at Sacramento, aged fifty-seven years. He was born at Wheatland, Cal., and was graduated from the University of California in the class of 1881. Mr. Jasper was well known on the Pacific Coast. He had been engaged in various important railroad engineering projects of the West.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

East Georgia Railway, Savannah, Ga.—Chartered in Georgia to build an electric or steam railway from Glenville, north via Hagan to Adabelle, about 30 miles, with an extension from Hagan to Claxton. Capital stock, $212,000. Headquarters, Savannah. Incorporators: H. P. Talmage, C. J. Baldwin and E. Leffler. [April 3, '15.]

FRANCHISES

Los Angeles, Cal.—On July 7 the Council of Los Angeles sold to P. D. Cornelius, president Malabar District Improvement Association, the franchise for the extension of the Brooklyn Avenue line on Evergreen Avenue to the east city limits for $100. The franchise will be turned over to the Los Angeles Railway at once without charge so that the extension may be built.

Los Angeles, Cal.—The Pacific Electric Railway has asked the Council for a franchise to double track its line to San Pedro via Gardena.

East St. Louis, Ill. — The East St. Louis & Suburban Railway has asked the Council for a franchise to extend its lines in East St. Louis to Nineteenth Street and Baker Avenue.

Lafayette, Ind.—The Lafayette & Northwestern Railway, through its failure to file a written acceptance with the auditor of Tippecanoe County, has forfeited the franchise granted by the Council on Aug. 7, 1914. [April 3, '15.]

Henderson, Ky.—The Evansville, Henderson & Owensboro Railway will ask the Council for a twenty-year franchise to operate its cars on the city streets, and proposes to construct interurban lines to Owensboro, Morganfield and Providence, Ky., if granted the franchise.

Haverhill, Mass.—The Bay State Street Railway has received a franchise from the Council to relocate its tracks on Main Street, between Fourth Avenue and Kenoza Avenue; on Water Street, east of Haverhill Street, and on Lincoln Avenue at the City Farm.

Haverhill, Mass.—The Massachusetts Northeastern Street Railway has received a franchise from the Council to relocate its tracks for 240 ft. on Main Street and also at the curves into White Street and to Kenoza Avenue.

North Andover, Mass.—The Bay State Street Railway has asked the Council for a franchise to extend its double tracks from Merrimac Street, North Andover, over the new Shawsheen Bridge into Sutton Street.

Corpus Christi, Tex.—The Council of Corpus Christi has passed the franchise applied for by J. H. Caswell to construct a railway from Corpus Christi to Ward Island. The franchise will be voted on by the people on July 30. [June 10, '15.]

TRACK AND ROADWAY

Marin County Electric Railway, Mill Valley, Cal.—The Railroad Commission of California has issued an order authorizing this company to pay a sales commission of 15 per cent on the portion of its stock remaining unsold, such commission to be paid only when stock has been fully paid up. The company was authorized on Nov. 23, 1914, to issue and sell 185½ shares of stock at the par value of $100 a share for the purpose of constructing a railway in Sausalito. [July 10, '15.]

Peoria & Chillicothe Electric Railway, Peoria, Ill.—Surveys of this company's line from Peoria to Chillicothe have been completed and the promoters are now ready to go ahead with the financing of the proposition. It is expected that the construction will be begun within a short time. [March 13, '15.]

Kankakee & Urbana Traction Company, Urbana, Ill.—This company is making surveys for the extension of its line from Ludlow to Paxton. A natural grove about midway between these points will be developed into a park by Paxton capitalists.

Sterling, Dixon & Eastern Electric Railway, Dixon, Ill.—This company has about completed the extension of its line in Dixon north on Crawford Avenue from Fellows Street to the grounds of the Illinois State epileptic colony.

La Salle County Electric Railroad, Ottawa, Ill.—Stockholders of this company have been called to meet on Aug. 17 to authorize the completion of the line between Ottawa and Mendota. O. D. Weaver, Jr., 37 South Wabash Avenue, Chicago, Ill., president. [May 22, '15.]

Union Traction Company of Indiana, Anderson, Ind.—A number of important changes have been made by this company at Anderson, including heavier rails and bridges for interurban traffic and a change in the routing of interurban cars in and out of the city. The company has placed 90-lb. rails on all of its right-of-way on Madison Avenue and Sixteenth Street, and the bridge at Sixteenth Street near Locust Street has been rebuilt of heavier material.

Indianapolis Traction & Terminal Company, Indianapolis, Ind.—This company has received an extension of time from the Board of Public Works of Indianapolis to Sept. 15 in which to begin the construction of a line on West Tenth Street from Bismarck Avenue to Tibbs Avenue. The time for completion is now set for Dec. 1.

Winona Interurban Railway, Warsaw, Ind. — A report from this company states that it has a good proposition for an amusement company for next year. Correspondence may be addressed to J. C. Schade, assistant treasurer.

Hutchinson (Kan.) Interurban Railway.—A report from this company states that it expects to construct ¾ mile of new track in Hutchinson.

Orleans-Kenner Electric Railway, New Orleans, La.—Operation has begun on this company's line from New Orleans to Kenner. E. A. Stanford, New Orleans, president. [Feb. 6, '15.]

Winnipeg (Man.) Electric Railway.—This company is building a 1-mile extension of its tracks on Marion Street, St. Boniface, to the Union Stock Yards. Plans are also being made to reconstruct ½ mile of track on Osborne Street from Kylemore Avenue to River Park.

Boston (Mass.) Elevated Railway. — This company will extend its Hardware Square-Central Square line to the Kenmore Street entrance of the Boylston Street subway via Pearl Street, Brookline Street, Cottage Farm Bridge, Commonwealth Avenue and Beacon Street. The line, which is now operated from Hanover Street to the Cottage Farm bridge via Massachusetts Avenue and Pearl Street, will be run between Hanover Street and Central Square.

Holyoke (Mass.) Street Railway.—On account of the increase in traffic from Holyoke to the Chicopee Falls section, this company is double-tracking its line from the Holyoke-Willimansett Bridge to Margaret Street.

Union Street Railway, New Bedford, Mass.—A petition has been presented to the Board of Aldermen of New Bedford to have the tracks of the Union Street Railway on Dartmouth Street moved to the center of the street. The railway is willing to change its tracks provided the city resurfaces the street.

Worcester (Mass.) Consolidated Street Railway.—Work has been begun by this company relaying its tracks on Main Street from Lincoln Square to Chandler Street. The rails weigh 126 lb. to the yard.

Worcester & Warren Street Railway, Worcester, Mass.—Citizens of West Brookfield have presented to the Council a petition for the relocation of this company's tracks on Main Street, West Brookfield.

Metropolitan Street Railway, Kansas City, Mo.—The city commissioners have awarded a contract to the American Bridge Company to construct a 1500-ft. viaduct at Eighteenth Street, Kansas City, Kan., over the yards of the Rock Island Railway. The viaduct will be a steel and concrete structure with roadbed for wheel traffic, car tracks and sidewalks. The cost, which is estimated at $115,000, will be shared by the Rock Island Railway, the Union Pacific Railroad and the Metropolitan Street Railway.

United Railways, St. Louis, Mo.—Plans are being made by this company to extend its Tower Grove line on Arsenal Avenue and Ivanhoe Avenue, St. Louis.

Springfield (Mo.) Traction Company.—This company plans to extend its State Street line from New Street to Fort Street and south on Fort Street to Grand Avenue, Springfield.

Moncton Tramways, Electric & Gas Company, Ltd., Moncton, N. B.—This company plans to construct an extension of its line on Bonaccord Street from Main Street to Church Street, about one mile.

Public Service Railway, Newark, N. J.—This company has made application to the Board of Public Utility Commissioners of New Jersey for permission to abandon its line in the borough of Kenilworth extending from a point at Westfield Avenue and Grand Street, near Aldene station, to South Twentieth Street and Boulevard, New Orange. As an alternative to abandoning the line the company asks permission to operate for a single fare of 5 cents for a ride anywhere on the road without giving or receiving transfers from any other line with which the Kenilworth line is connected.

Trenton, Lakewood & Seacoast Railway, Trenton, N. J.—Representing himself and a number of other bondholders of the Trenton, Lakewood & Seacoast Railway Company, George O. Vanderbilt, Princeton, has applied to the Board of Public Utility Commissioners of New Jersey to reopen the proceedings under which the board authorized the company to issue $190,000 of bonds and $85,000 of stock. The contention of Mr. Vanderbilt is that the permission granted by the board would permit the exploitation of an over-issue of bonds for the purposes to which the proceeds are to be devoted, and that the result would be to depreciate the value of outstanding bonds. The petition set forth that a competent engineer employed by the bondholders had estimated that only $135,000 would be required to construct 10 miles of line between Lakewood and Point Pleasant. [June 26, '15.]

Binghamton (N. Y.) Railway.—The Public Service Commission for the Second District of New York has ordered the Binghamton Railway to extend its lines from the present terminus to the northern village line of Port Dickinson.

Brooklyn (N. Y.) Rapid Transit Company.—The Public Service Commission for the First District of New York has received a report from the chief engineer giving the footings of the bids which were opened on July 9 for the installation of tracks on the New Utrecht Avenue elevated railroad in Brooklyn. This is a city-owned line, connecting through Thirty-eighth Street with the Fourth Avenue subway, and running over the route of the so-called West End line to Coney Island. The steel structure is nearly completed, and the commission will soon let the contract for the installation of tracks. Steel rails and other track materials for this line have been already purchased by the commission, and the bids opened July 9 were for the laying of ties, tracks and doing all other work required to put the railroad into operating condition except the work of installing the third-rail and electrical signal apparatus, which will be done by the New York Municipal Railway Corporation as a part of the equipment under the dual system contracts. The work will cover only the elevated part of the line, beginning at about Thirty-eighth Street and Tenth Avenue and extending through New Utrecht Avenue, Eighty-sixth Street and Stillwell Avenue to a point near Avenue Y. The three lowest bids were as follows: Ward & Tully, Inc., $71,355; Joseph A. McElroy, $75,183.20, and W. F. Jordan, $78,525.

Buffalo & Depew Railway, Depew, N. Y.—This company reports that during August and September it expects to build 4000 ft. of track along Ellicott Road and Central Avenue to the passenger station of the New York Central Railway, Lancaster. It has just completed rebuilding 850 ft. of double track on Genesee Street. The company expects to continue the work of rebuilding and ballasting its track during the entire summer.

***Tiffin, Ohio.**—Chicago and New York financiers are interested in a proposition to build a railway between Tiffin and Bucyrus. Much territory for the right-of-way has been offered free of charge. The most favorable route is one via Oceola, Lemert, Benton, Plankton and Melmore.

Berlin & Northern Railway, Berlin, Ont.—This company reports that it is extending its line ½ mile from Bridgeport.

London (Ont.) Street Railway.—This company is reconstructing its single track on Ridout Street from Horton Street to Garfield Street, 4000 ft., with 80-lb. A. S. C. T. rail, supplied by the Algoma Steel Company.

Sarnia (Ont.) Street Railway.—This company is in the market for ½ mile of rails, trolley wire, ties, etc., for use in the construction of an extension of its line from the corner of Christiana Street and St. Clair Street to Clifford Street, Sarnia.

Toronto (Ont.) Civic Railway. — The Mayor and the Board of Control of Toronto have received assurance from the Ontario government that if the work of constructing a permanent civic line on Bloor Street is proceeded with legislation will be forthcoming at the next session, provided the expenditure does not exceed $125,000. The rails for the line are on the ground and the application was made to the government following the discovery that the city had not received approval for the project. Work on the line, which has been at a standstill for weeks, will now be resumed.

Johnstown & Somerset Street Railway, Johnstown, Pa.—Grading has been begun on the Johnstown end of this company's line from Kelso southward. Owing to a controversy over the rights-of-way through Boswell, it is probable that the line will extend along the edge of the borough instead of through the heart of the town. Plans are being considered to extend the line from Somerset to Berlin, where connection could be made with Meyersdale. G. C. Winslow, general manager. [May 15, '15.]

Philadelphia, Pa.—Bids are desired until Aug. 16 by A. M. Taylor, director Department of City Transit, Philadelphia, for the construction of concrete column foundations and piers for about 26,000 ft. of elevated railway on Front Street, Kensington Avenue and Frankford Avenue, known as Contract 501. Plans and specifications are on file at Room 748 Bourse Building, or may be secured on a deposit of $10, pending return.

Scranton & Binghamton Railroad, Scranton, Pa.—This company reports that it plans to construct an extension of its lines from Foster to Brooklyn, about five miles.

Montreal (Que.) Tramways.—This company is changing the location of its tracks on Notre Dame Street between First Avenue and Dominion Park to the center of the street and is building an extension of 1.1 miles. The line between Dominion Park and Bernard Avenue, about 4.3 miles of single track, is also being reconstructed. The company has just built about 1 mile of single track from the "Y" at Bernard Avenue to the westerly limits of Montreal East. The rail being used is No. 97 L-399 section.

Rhode Island Company, Providence, R. I.—Arrangements are being made by this company for the laying of tracks on Fountain Street, Providence, and it is expected that cars will be running from Aborn Street to Exchange Place during August.

Chattanooga (Tenn.) Traction Company.—Work has been begun by this company on the construction of a new line on Second Street between Walnut Street and Broad Street, which will connect with the belt railway.

Knoxville Railway & Light Company, Knoxville, Tenn.—This company has begun a considerable amount of improvement work in connection with the city's paving operations. In most cases creosoted ties imbedded in concrete are being used, with a concrete-wearing surface between the rails and on the outside. Wood blocks have been laid on Gay Street. The Cumberland Avenue line will be rebuilt from Ninth Street to the city limits. Plans are being made to build an extension of its line from Fountain City to Smithwood, 1 mile.

Brownsville (Tex.) Street Railway.—Following the granting of a franchise for the extension of its lines, this company has announced that it will establish storage-battery cars on its lines in Brownsville. Service, which was suspended three months ago, will be resumed with the arrival of new equipment in a month. The extension will be made to effect a connection with the Rio Grande Railway to Point Isabel. It is reported that the company plans an interurban service to the coast towns.

Corpus Christi Railway & Light Company, Corpus Christi, Tex.—This company announces the expenditure of $100,000 on extensions and improvements to its line. Two of the most important of these extensions are a line about 3 miles long following the bluff line of Nueces Bay to a new residential section of the city and an extension from Epworth-by-the-Sea, the present terminus, to the Nueces County Causeway, about 1 mile.

Dallas Consolidated Electric Street Railway, Dallas, Tex.—This company has practically completed the double-tracking of its line on Bryan Street, Dallas.

Fort Worth & Denton Interurban Railway, Fort Worth, Tex.—It is reported that this company plans to begin work soon on the construction of its proposed railway from Fort Worth to Denton.

Beaumont, Liberty & Houston Traction Company, Houston, Tex.—Surveys have been made of this company's proposed line from Beaumont to Anahuac and Houston. J. H. McCracken, general manager. [May 29, '15.]

Petersburg & James River Railway, Petersburg, Va.—A report from this company states that construction on its proposed railway from Petersburg to City Point will be begun about July 19. The line will consist of 9½ miles of single track, standard gage. Power will be supplied by the Virginia Power Company. J. Walter Long, 110 Bollingbrook Street, Petersburg, president. [June 12, '15.]

Princeton (W. Va.) Power Company.—Operation has been begun to the foot of South Walker Street on this company's line leading toward Bluefield. Work on the extension of the line up Brush Creek Valley is proceeding rapidly.

SHOPS AND BUILDINGS

United Traction Company, Albany, N. Y.—It is reported that officials of this company, the Schenectady Railway and the Albany-Southern Railway will meet in the near future for the purpose of promulgating plans for jointly erecting a terminal station in Albany. It is planned to have a terminal station that will be suitable to all three companies, and to which the companies can jointly contribute for erection and maintenance. The cost of the terminal has been taken into consideration and although no specifications have been drawn, it is estimated to be more more than $100,000.

Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont.—This company plans to construct a station at Niagara-on-the-Lake, Ont., the terminus of its line from St. Catharines to the Niagara River. The structure will be 47 ft. x 25 ft., with an open shed 48 ft. x 20 ft. The building will be of stone up to 5 ft., the balance being shingle construction. The shed will be carried on pillars resting on stone pedestals 5 ft. high. Oak wainscoting with metallic side walls and ceiling will be used for the interior of the building.

Springfield (Ohio) Railway.—During the past year this company has expended about $300,000 in erecting its new carhouse at East Street and Clifton Street, Springfield, and improving its power plant. The contract price of the new carhouse was $90,000, exclusive of equipment. The old power plant has been practically rebuilt. New engines and dynamos have been installed and two new boilers are now being put in place. The cost of the improvements being made at the power plant is estimated at $185,000. Two old frame carhouses on adjoining grounds have been torn down and a third one reroofed for use as a supply room.

Toronto (Ont.) Civic Railway.—The Toronto Board of Control has recently asked for bids for the machine shop equipment of this company's new carhouse at Danforth Avenue, consisting of a 14-in. lathe, 150-ton wheel press, shaper, radial drill, vertical drill, 3000-lb. portable crane, double emery stand, vise, hack saw and a 35-hp. induction motor.

Charlottesville & Albemarle Railway, Charlottesville, Va.—This company reports that the contract has been awarded to the King Lumber Company and work has been begun on the construction of its office building and substation in Charlottesville. The company has also purchased a 200-kw. rotary converter.

Manufacturers and Supplies

ROLLING STOCK

London (Ont.) Street Railway is having a number of its old cars remodeled at Preston, Ont., for pay-as-you-enter service.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., is considering the adoption of pay-as-you-enter cars. One car has been changed for a few weeks' experimental trial.

Michigan Railway Company, Kalamazoo, Mich., has ordered two more all-steel, 70-ft. limited parlor cars from the St. Louis Car Company for the Kalamazoo-Grand Rapids line.

Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo., has this month placed in service four interurban cars built by the Cincinnati Car Company, the details of which, as compared with the cars formerly placed in service, are as follows: length, 59 ft., with truck centers 37 ft. instead of the previous 35 ft. 6 in.; seating capacity, sixty-eight instead of sixty-four persons; aisles 4 in. wider; smoking-car seats finished with fabrikoid instead of leather; fabrikoid curtains; flat window glass instead of curved in curved rear ends of cars; outside door for motorman; prism instead of leaded glass above windows; steel window sash; all double windows; larger toilets; Baldwin trucks; Peter Smith heaters; quadruple equipment Westinghouse 100-hp. motors for operation on 600 volts or 1200 volts; double-end Type H.L. control Westinghouse air-brakes, of the straight and automatic.

TRADE NOTES

U. S. Metal & Manufacturing Company, New York, N. Y., has been appointed railroad sales agent for the injector sand-blast apparatus manufactured by J. M. Betton.

Westinghouse Traction Brake Company, New York, N. Y., has received orders for air-brake equipment for the eight cars recently ordered by the Corpus Christi Railway & Light Company, Corpus Christi, Tex., and the six cars ordered by the New York & Queens County Railway, New York, N. Y.

F. W. Roth, who was formerly secretary and director of the J. N. Johns Manufacturing Company, has been recently appointed general manager of the Railway Specialties Corporation, 29 Broadway, New York City. This concern is manufacturing a motorman's new quick-action, adjustable seat.

Wasson Engineering & Supply Company, Milwaukee, Wis., has just shipped a repeat order for ten air-operated trolley bases to the Michigan United Traction Company, Jackson, Mich. These trolley bases are to be used on the new all-steel, high-speed cars of the Michigan Railway, running on the 2400-volt, third-rail line between Kalamazoo and Grand Rapids, Mich.

Esterline Company, Indianapolis, Ind., has just closed a record-breaking month for its graphic meter sales. In addition to a large list of industrial companies, the following electric railways have purchased instruments during the month of June: Public Service Commission of Indiana, utility watt-meter and volt-meter; Terre Haute, Indianapolis & Eastern Traction Company, ammeter; Virginia Railway & Power Company, Norfolk, Va., watt-meter.

Southern Car Company, High Point, N. C., was erroneously noted in the ELECTRIC RAILWAY JOURNAL of June 10 as having received an order from the Little Rock Railway & Electric Company, Little Rock, Ark., for three buses. The name of the purchasing company should have been the Argenta (Ark.) Railway, which operates on the north side of the Arkansas River. The buses will be used for the transportation of passengers from the cars of the Argenta Railway over the bridge into Little Rock to the cars of the Little Rock Railway & Electric Company, and vice versa.

ADVERTISING LITERATURE

Kernchen Company, Chicago, Ill., has issued a folder describing its siphonage ventilators.

Railway & Industrial Engineering Company, Pittsburgh, Pa., has issued a folder on its suspension lightning arrester.

Walter A. Zelnicker Supply Company, St. Louis, Mo., has issued a sheet describing its car mover for moving heavily-loaded cars.

Sprague Electric Works of General Electric Company, New York, N. Y., have issued a folder on their "Sprague-duct" enameled conduit.

Beaudry & Company, Inc., Boston, Mass., has issued a catalog describing its hammers for light and heavy railroad machine and general forging work.

Chicago Pneumatic Tool Company, Chicago, Ill., has issued Bulletin E-36 superseding No. E-29, which describes and illustrates its Duntley electric grinders.

General Electric Company, Schenectady, N. Y., has issued a catalog describing its various types of street-lighting brackets and center-span fixtures for mazda lamps.

Titanium Alloy Manufacturing Company, Niagara Falls, N. Y., has issued a catalog which contains various magnified sectional views and lists of the composition of its alloys for aluminum and other standard bronze castings.

Dielectric Manufacturing Company, St. Louis, Mo., has issued a booklet on its various types of paint varnish and insulating compounds. The booklet contains tables and data relating to the insulating qualities of these various materials.

Trussed Concrete Steel Company, Youngstown, Ohio, has issued a folder describing a remarkable test which led to the installment of its United steel sash in the plant of the Edison Company. In the test two window sashes were placed on opposite sides of a brick furnace. The furnace was then subjected to a fire of unusual intensity for 35 min. In addition to this ordeal a stream of water from a 3-in. hose was played on the sash structure. After neither test was any sign of weakness discernible.

Stone & Webster Engineering Corporation, Boston, Mass., constructing engineers, have issued a tastefully prepared booklet which describes pictorially the numerous shops, factories, warehouses, mills, offices, educational buildings, power stations, etc., recently constructed by this company. The work includes a wide variety of construction problems which in most instances had to be met within brief time limits. Among the illustrations are included those of hydroelectric power stations of the Mississippi River Power Company and the Pacific Light & Power Corporation.

Westinghouse, Church, Kerr & Company, New York, N. Y., has issued a sheet which contains a potpourri of illustrations of buildings designed and constructed by this company. To show the scope of this work the illustrations are so arranged as to give the appearance of a bird's-eye view of a large city. Such a city, it is said, would cost $50,000,000. There would be only thirty-three cities as large in the whole United States. To present the idea of size in other ways the sard states that all the wage earners of Hartford, Conn., could find employment there; over 56,000,000 sq. ft. would be under roof; the building and materials made over 1,000,000 tons of freight, which to haul at once would require a solid train 530 miles long.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued Leaflet No. 3823, describing the construction and operation of rotary converters of the commutating-pole type. A number of construction details are illustrated including a diagram of the brush-lifting device. A number of installation views are also shown. Leaflet No. 3760 describes a.c. remote hand-control switchboards. The leaflet goes into detail in describing the application of this type of switchboard together with the different methods of mounting, such as frame, wall, ceiling, etc., and a typical wiring diagram is given of the connections. Leaflet No. 3820 describes Westinghouse a.c. heavy duty slip-ring motors, type CW. This motor is especially adapted for constant and varying speed applications where continuous service and strong starting effort are required, and where squirrel-cage motors would not be adaptable. Large squirrel-cage induction motors are described and illustrated in Leaflet No. 3787. These motors and their features, adapting them for heavy work, are thoroughly described and illustrations are given of the detail parts.

The serious individual who cures himself of insomnia by sitting up all night over a game of solitaire—and then juggles the deal so the sense of triumph will sweeten his slumbers —he seems "queer", doesn't he?

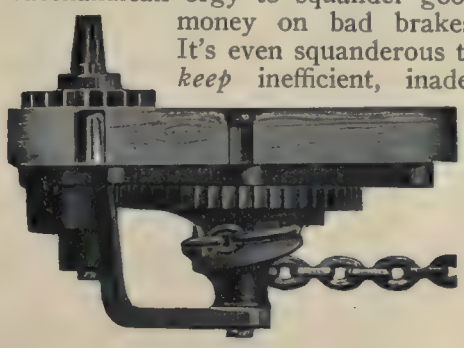
Nobody cheats at solitaire! Sure? How about installing hand brakes that comply with the laws of the land but not with the laws of nature?

Oh, yes—there are such cases! The "queer" part is that it costs a whole lot more in real money to run with a plain staff brake that isn't worth a whoop than it does to operate with

Peacock Brakes

that will stop a car with air-brake effectiveness. The Peacocks will save good hard dollars from the day they are installed.

Nowadays, when "Economy first" is growling like mealtime at "Safety first," it certainly looks almost like a bacchanalean orgy to squander good money on bad brakes. It's even squanderous to *keep* inefficient, inadequate brakes instead of pulling them out by the roots for the immediate substitution of "Peacocks." Every road that has not a Peacock Brake on every car is losing money every minute.



Every few days someone makes the substitution—a sign of the open eye that doesn't blink at facts that save money. Summer time means quick deliveries and favorable prices in the brake business.

It's summer time now.

National Brake Co.

888-890 Ellicott Square, Buffalo

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AUDITS—SYSTEMS—APPRAISALS—EXAMINATIONS
TWENTY-FIRST FLOOR, WOOLWORTH BUILDING
NEW YORK

The Rail Joint Company
185 Madison Avenue
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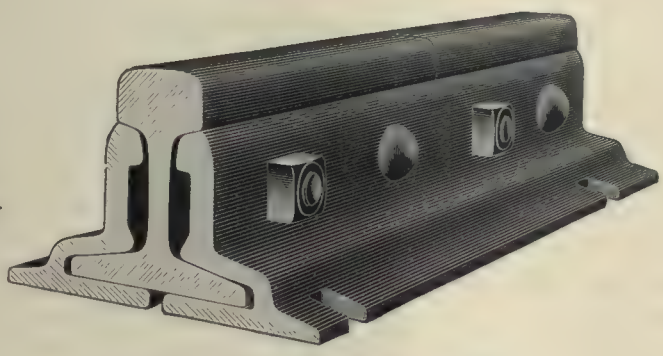
ROLLED FROM BEST QUALITY STEEL



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Makers also of WEBER, WOLHAUPTER and ONE HUNDRED PER CENT. RAIL JOINTS for Standard, Girder and Special Rail Sections. Also Joints for Frogs and Switches; Insulated Rail Joints and Step or Compromise Rail Joints

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1640 Transportation Bldg., Chicago, Ill. and Los Angeles, Cal.

ELECTRICAL TESTING LABORATORIES, INC.
Electrical, Photometrical and Mechanical Testing.
80th Street and East End Ave., New York, N. Y.

IT IS A PAYING INVESTMENT
to carry an advertisement in the ELECTRIC RAILWAY JOURNAL every week in the year.

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ROOSEVELT & THOMPSON
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Report, Investigate, Appraise, Manage Electric Railway, Light and Power Properties.

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Inspection Railway Equipment & Materials
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Combine Your Electric Railway and Electric Lighting Pole

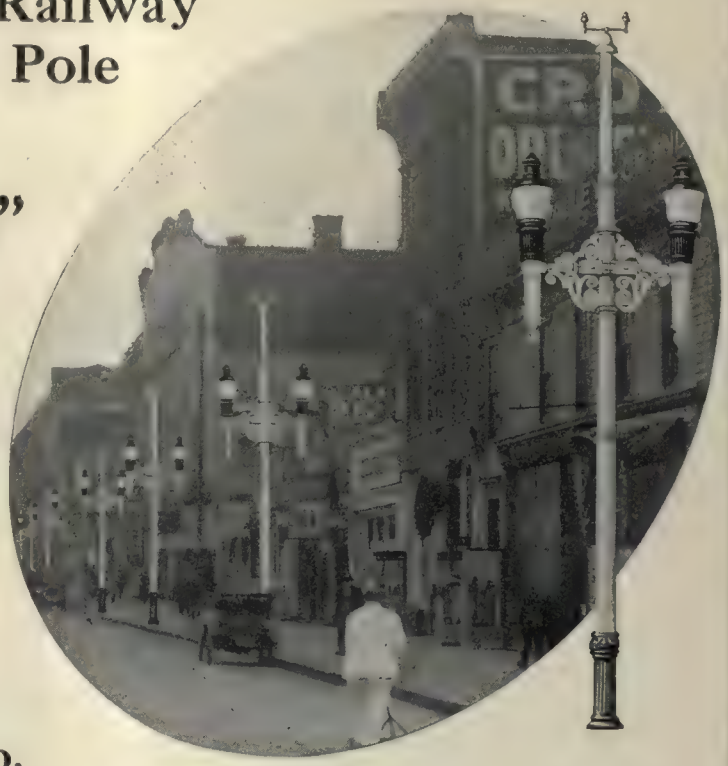
"ELRECO COMBINATIONS"

are your big opportunity for cutting line upkeep. Here is the economy you have been considering, discussing and advising. These "double-purpose" poles will halve your initial cost.

And at the same time their patented "Wire-Lock" Swedge Joint features make "Elreco" poles corrosion-resisting and proof against telescoping.

Sounds good?

Get the data.



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Cincinnati, Ohio

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Telephone Train Dispatching
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Selector and Telephone Apparatus

combines the safety and efficiency of the telephone system of directing train movements with the reliability and efficiency of Western Electric apparatus. Selector and telephone apparatus is designed and manufactured to give a maximum of service with a minimum of maintenance.

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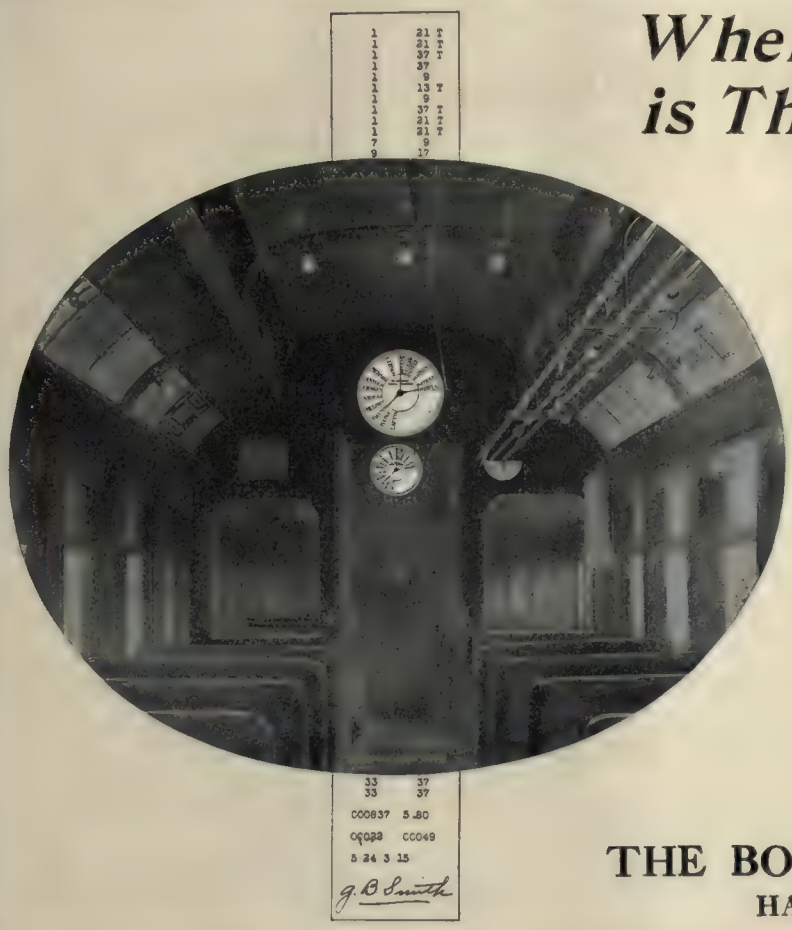
Discuss your problems with us

New York, Buffalo, Newark, Philadelphia, Boston, Pittsburgh, Atlanta, Richmond, Savannah, New Orleans, Houston, St. Louis, Chicago, Milwaukee, Indianapolis, Detroit, Cleveland, Cincinnati, Kansas City, Omaha, Oklahoma City, Minneapolis, St. Paul, Dallas, Denver, San Francisco, Oakland, Los Angeles, Seattle, Portland, Salt Lake City

Write for further details

EQUIPMENT FOR EVERY ELECTRICAL NEED
Member Society for Electrical Development. "Do it Electrically"



When the Conductor is Through—

he merely turns a handle on the end of the

Bonham Traffic Recorder

and a car slip is printed which gives the total number of CASH PASSENGERS, the total number of TICKET PASSENGERS, the total PASSENGER MILEAGE, the total CASH COLLECTED, the DATE, TRAIN and DIVISION. To which the conductor signs his name through an opening in the door of the RECORDER.

These PERMANENT DAILY STATEMENTS OF EACH TRAIN are a complete check on train operation as well as on fare collection.

The "Bonham" offers a system without a flaw.

Read about it in the new Catalog—"Earnings per Passenger Mile." Yours for the asking.

THE BONHAM RECORDER CO.
HAMILTON, OHIO, U. S. A.

2615

No binding of the cord in the *EARLL RETRIEVERS or CATCHERS*

The large opening in Earll Catchers and Retrievers allows the cord to run freely without imposing any cord wear.
In the whole construction there is nothing to bind or stick.
Positive and *dependable* operation is built into the Earll.
For more than fifteen years a standard product.
For light cars, Earll Retrievers and Catchers are the lightest on the market.

C. I. EARLL

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W. R. Kerschner Co., Inc.
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The Grayson Railway Supply Co.
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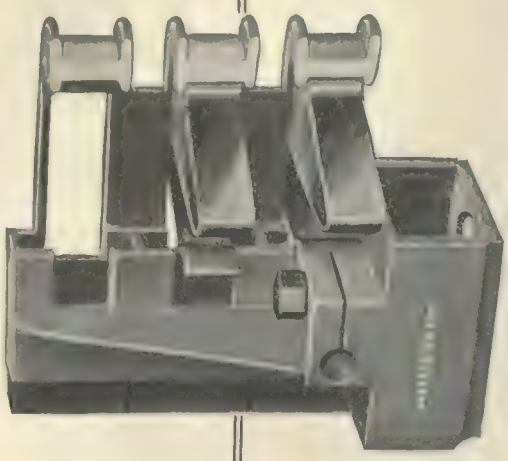

There was "Room Up Front" for a better brush holder

—it was filled by the

Lindall Brush Holder

You need it for your railway motors because it gets rid of just the difficulties you have been encountering.
Some of the features are—
Brushes do not have to be recessed.
No parts require adjustment after being once put into place.
Pigtails are not required since springs and contacts are ample to carry the maximum current.
No screws or nuts to become loose and cause trouble.
Brushes are easily inspected and renewed.
Better brush contact.
Write—right now—for the facts and prices.

Albert & J. M. Anderson Mfg. Co.

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When You Talk Economy

don't forget that you have important points at which you may be wasting a lot of money per year.
At the brushes of your motors.
That waste is primarily due to cracking, chipping and sparking.
We have solved that problem for you with Moisture Proof

"No Spark" Brushes

We claim they will do just what we say. Prove it for yourself by actual test—by sending for samples.
Once you try them, you will be done with brush difficulties for all time.
Don't take us at our say so.
Investigate.
A postal will bring the samples.

Calebaugh Self-Lubricating Carbon Co.

1502 Columbia Ave., Phila., Pa.

This Meter

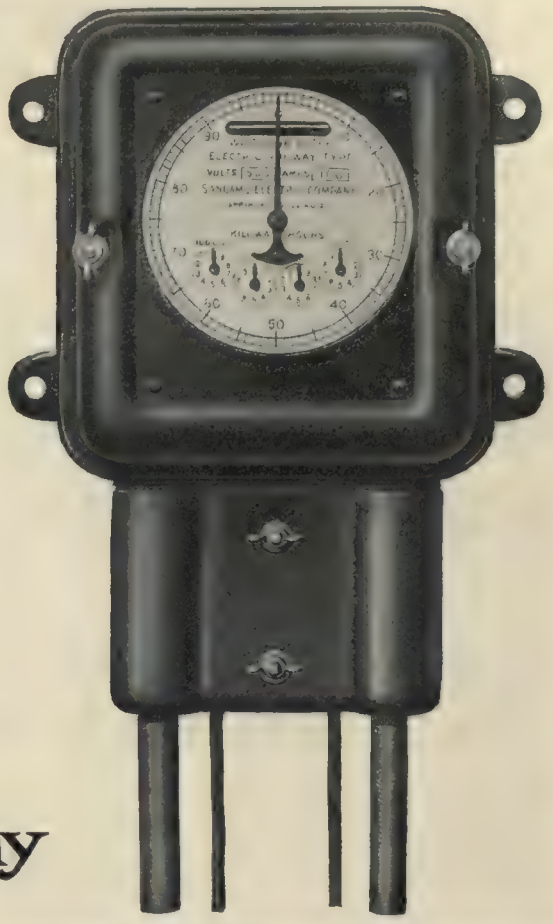
has a very definite place on YOUR cars.
It provides very definite savings in power expenses.
Large savings.
It increases man-efficiency and equipment-efficiency—
—in a constructive way.

ECONOMY
BUILT LIKE A WATCH
METERS

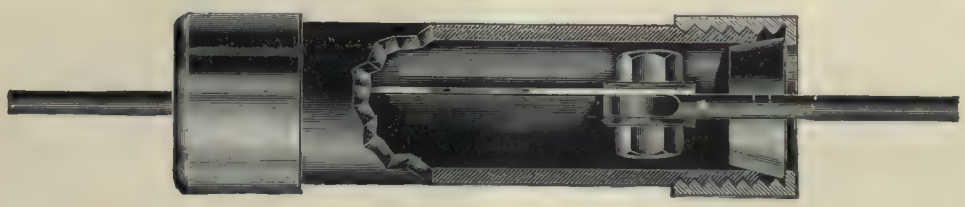
are the only means at your disposal to accurately measure the power consumption of cars.
You can well afford to investigate.

Described in Bulletin 416. Write for it.

Sangamo Electric Company
Springfield, Illinois



The N-W Renewable Cartridge Fuse



Will Cut Your Fuse Cost 80%

over non-renewable fuses.

At the same time you get circuit protection which will open the circuit at the necessary stage of current overload and do it promptly.

In actual tests N-W Fuses were put across 600-volt circuits and were uninjured and easily renewed.

If you prefer **STANDARD FUSES** we make them for all capacities. You will find them on important railways throughout the country.

You owe it to your maintenance sheet to interview us on fuses.

Get Columbia Bulletins on these Columbia Shop Cost Cutters:

Axle Straighteners.
Bearings for Armatures and Axles.
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Car Hoists, Car Replacers.
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Grid Resistances, Signal or Target Switches.
Trolley Wheels, Tension Stands.
Track Special Work, N. W. Cartridge Fuses.

Columbia Machine Works & Malleable Iron Co.
Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

THE "STANDARD" BRAND ON YOUR MATERIAL IS AN ASSURANCE OF EVENTUAL ECONOMY

STANDARD STEEL WORKS CO.

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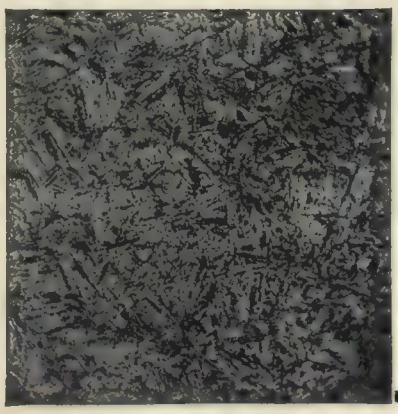
BP Motor Gearing

No. 2

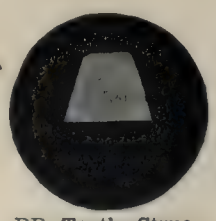


BP Quenched

BP Gearing has a greater refinement of structure than gearing quenched in oil or water. The material is nearly "file hard" on the surface. The hardness gradually diminishes toward the tooth center or core with a corresponding increase in toughness.

Note

Structure Refinement Giving Gearing with High Hardness and High Ductility.



BP Tooth Structure

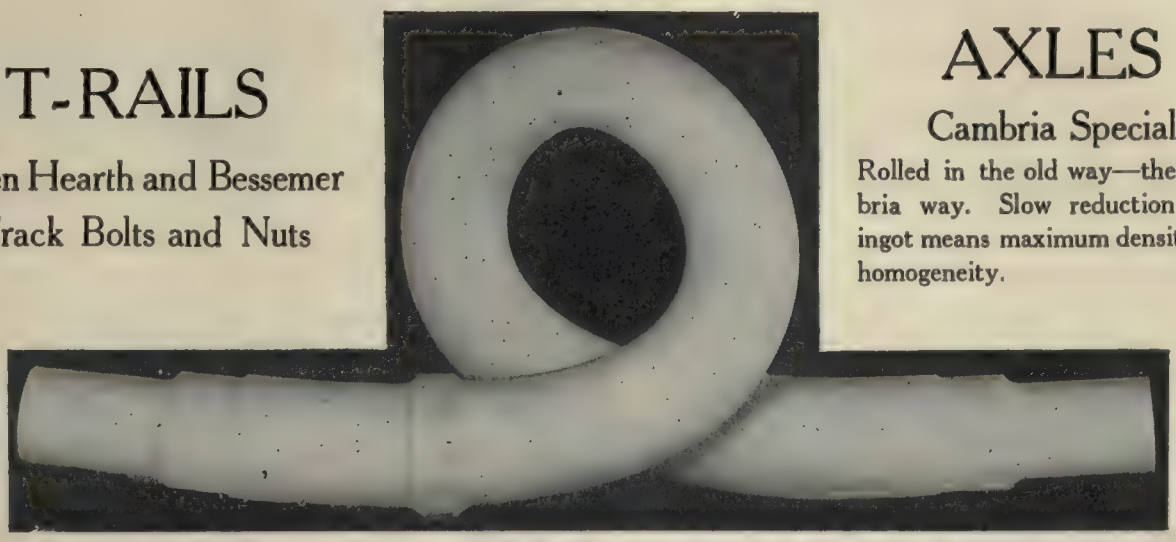
Write

Nuttall - - Pittsburgh

CAMBRIA

T-RAILS

Open Hearth and Bessemer
Track Bolts and Nuts



AXLES

Cambria Special

Rolled in the old way—the Cambria way. Slow reduction from ingot means maximum density and homogeneity.

Our axles represent the highest development in the art of heat treating. Axles for street and interurban lines, our Specialty.

CAMBRIA STEEL COMPANY

General Sales Office: Morris Bldg., PHILADELPHIA

Sales Offices: Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Detroit, New York, Philadelphia, Pittsburgh, St. Louis, San Francisco, Tacoma, Montreal
Works at Johnstown, Pa.

Energy

which represents your expenditure for coal, for depreciation of power generating machinery, for land rentals, for labor—spent to move cars—
Suppose the demand for that energy were to come down 15% while you were moving the same traffic—
It's been done—it's being done—
by the application to cars of

Rollway Bearings

And the railway systems that have thus equipped their cars are effecting that saving and savings in other directions.
Do you want to?
Write us.

The Railway Roller Bearing Co.

Syracuse, N. Y.

To meet the requirements of its high class service—

The London & Port Stanley Railway

ordered

Jewett Steel Cars

one of which is shown above.
They are decidedly "cars of character."
Let us figure on *your* new requirement.

THE JEWETT CAR CO., Newark, Ohio

THE CINCINNATI CAR COMPANY

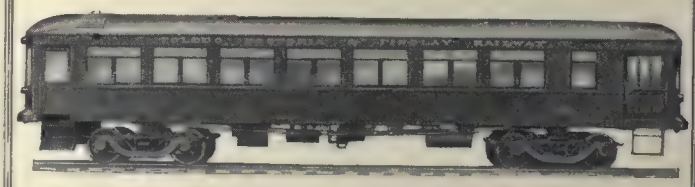
WORKS:

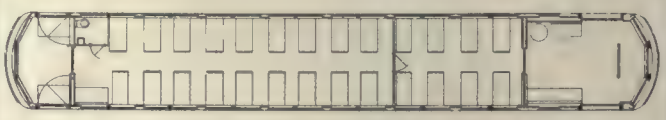
WINTON PLACE
CINCINNATI, OHIO

Niles Car & Mfg. Co.
Niles, Ohio

We believe this is the best three-compartment "single end" steel car ever built, and would like to tell you more about it.

It is 56 feet 9½ inches over all, 8 feet 6½ inches wide, is geared for 60 m.p.h., seats sixty,





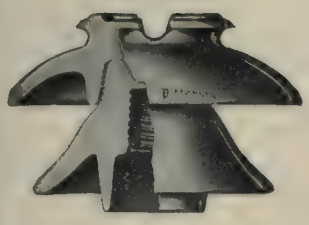
has 40-inch seats, yet it weighs only 34 tons on track, complete with Baldwin trucks, Westinghouse 304-A motors and automatic air brakes.

Side walls are of steel, cork and Agasote and form plate girders from sills to letter panels.

For train service it is fitted with end doors and radial couplers.

Write for our catalog.

No. 174
Volts. 35000



They Will Not Fail You at the Critical Moment

Pittsburg High Voltage Insulators

No. 175
Volts. 45000

"Of Unvarying Excellence"

will carry sudden extra voltages beyond their rating without breaking down. The care which is taken in their making insures the absence of flaws so dangerous to voltage transmission. You buy RELIABILITY in Pittsburg Insulators—protection in the handling of power. We solicit correspondence.

THE PITTSBURG
HIGH VOLTAGE INSULATOR CO.
Main Office and Factory: DERRY, PA.

ROEBLING

Trolley Wire

Wire Rope Wire Strand

John A. Roebling's Sons Company
TRENTON, N. J.

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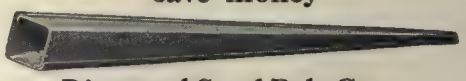

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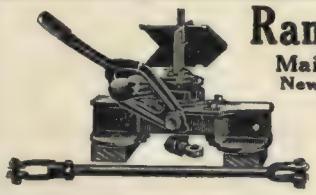

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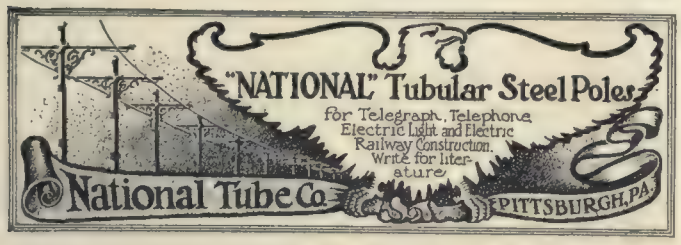

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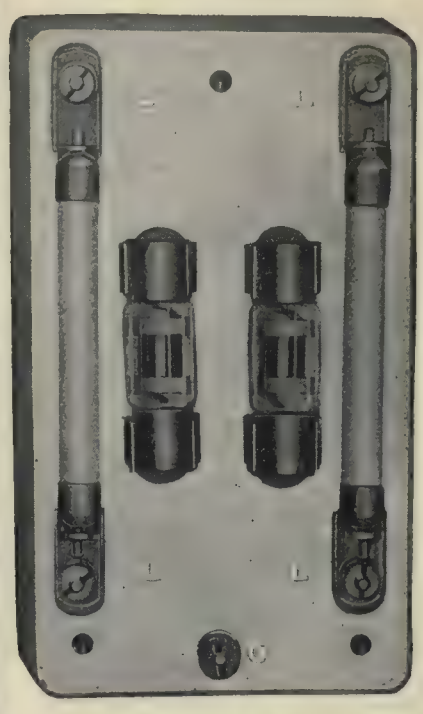

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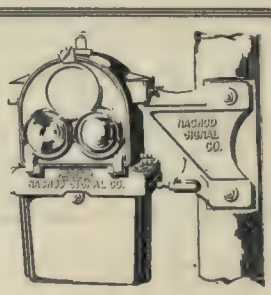

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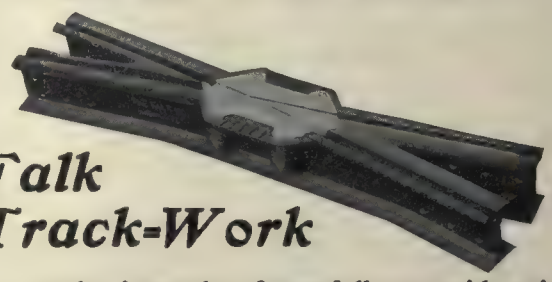

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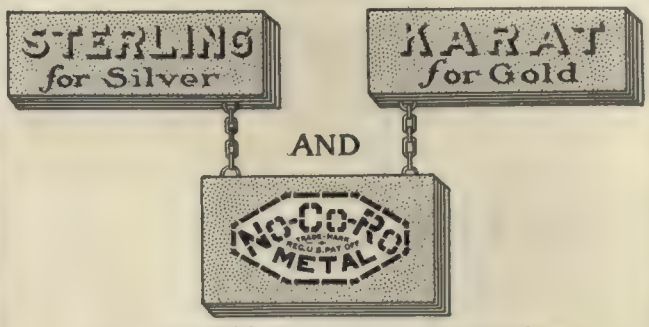

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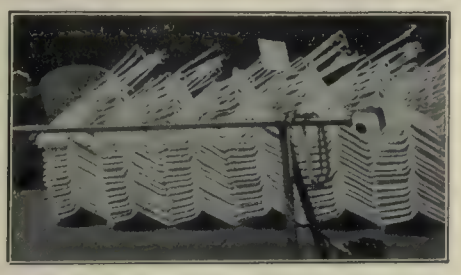

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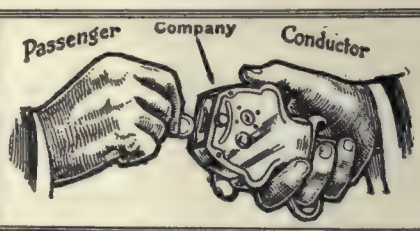

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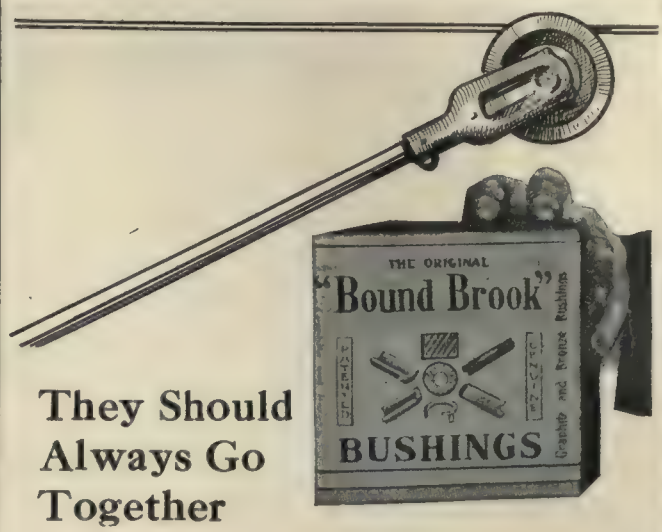

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20—Comb. Int. Cars, Bald. Trucks, 4 Wgh. 119 Motors.
8—Brill 22′ Closed Cars, Wgh. 68 Motors, Peck. Trucks.
1—Jackson and Sharp 18′ Car Body.
4—Brill 30′ Express Cars, Brill 22-E Trucks.
9—Brill 30′ Express Cars, complete, 4 G.E. 1000 Motors, AA1 Air Brakes, Brill 27-G Trucks.
10—Wason 10 B. Open Cars, G.E. 1000 Motors, Bemis Tr.
5—Brill 10 B. Open Cars, West 12A M., Brill 21-E Trucks.
8—Brill 14 B. Open Cars, Wgh. 56 Motors, Brill 22-E Tr.
8—West. 101B-2 Railway Motors, complete.
40—G.E. 90 Railway Motors, complete.
20—G.E. 66 Railway Motors, complete.
103—G.E. 88-B brand new Motors, complete.
12—G.E. 73 Railway Motors, complete.
24—G.E. 87 Railway Motors, complete.
20—G.E. 57 Railway Motors, complete.
20—G.E. 80 Railway Motors, complete.
12—G.E. 54 Railway Motors, complete.
60—G.E. 1000 Railway Motors, complete.
60—G.E. 800 Railway Motors, complete.
30—West. 12A Railway Motors, complete.
32—West. 49 Railway Motors, complete.
8—West. 38B Railway Motors, complete.
10—West. 112 Railway Motors, complete.
4—West. 68-C Railway Motors, complete.
4—West. 68 Railway Motors, complete.
22—G.E. 80 Armatures, brand new.
2—G.E. 87 Armatures, brand new.
2—G.E. 73-C Armatures, brand new.
4—G.E. 67 Armatures, brand new.
18—G.E. 57 Armatures (second-hand), two turn.
30—G.E. 57 Form A Motor Casings.
3—West. 101-B2 Armatures, brand new.
3—West. 93A-2 Armatures, brand new.
3—West. 93A Armatures, brand new.
22—K6 Controllers. 62—K10 Controllers.
44—K11 Controllers. 30—K14 Controllers.
28—K2 Controllers. 28—B29 Controllers.
2—Sets Brill 27G Trucks, 4′ 6″ wheelbase.
6—Brill 21E Trucks, 7′ 6″ and 8′ wheelbase.
10—Dupont Trucks, 7′ 6″ wheelbase.

All of the above apparatus is in first class condition for immediate service. For further particulars apply to

W. R. KERSCHNER CO., Inc., 50 Church Street NEW YORK, N. Y.

MACGOVERN AND COMPANY
INC.

FRANK MACGOVERN, Pres. & Gen Mgr.

114 LIBERTY STREET NEW YORK CITY
'Phone, 3375-3376 Rector

60 CYCLE ROTARY CONVERTERS

1—300 KW. Westinghouse, 3 phase, 600 volts, D.C., 600 RPM., 500 amps., 370 volts AC., with starting motor.
1—100 KW. Gen. Elec., type TC, form A, 550 volts, 182 amps. DC., 340 volts AC., 1200 RPM.

25 CYCLE ROTARY CONVERTER

1—300 KW. Allis-Chalmers, 3 phase, 6 pole, 650 volts, 462 amps., 500 RPM.

Immediate Delivery

THIS IS OF NECESSITY ONLY A PARTIAL LIST—
SEND FOR CATALOG

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL

Write for Price and Full Particulars to

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

COMPLETE ARMATURES FOR SALE

FOR ALL THE STANDARD
STREET RAILWAY MOTORS

GET OUR PRICE WE CAN SAVE YOU MONEY

America's Greatest Repair Works

CLEVELAND ARMATURE WORKS, Cleveland, O.

Big Results from Little Ads

The advertisements in the Searchlight Section are constantly bringing together those who buy and sell, rent and lease or exchange. They convert idle commodities into useful cash, idle cash into useful commodities, and that which you have but don't want into that which you want but don't have. The cost is a trifle, the results considerable.

Get your Wants into the Searchlight

SEARCHLIGHT SECTION

Manufacturing Sites for Lease
with Building and Electric Power
At Boonton, New Jersey, 30 miles from Hoboken.

Twenty acres of ideal factory sites for lease in lots as desired on attractive terms. Several buildings ready for occupancy. Served by the main line of the D. L. & W. Railroad, with sidings on the property. The Rockaway River and the Morris & Essex Canal bound the property on two sides.

Electrical power available at low rates from Jersey Corporation, whose power station is located on the site. This Company already supplies power to many plants in vicinity. Labor conditions ideal. The Boonton Board of Trade will co-operate with owners to provide attractive houses for workmen and their families.

For particulars regarding these ideal manufacturing conditions, inquire of W. S. Barstow & Company, Inc., Engineers and Managers, 50 Pine Street, New York, N. Y.

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Rotary Converters, Alternating Dynamos,
Motor Generator Sets, Direct Current Dynamos,
Transformers, Alternating Motors
Railway Motors, Direct Current Motors,

ALSO ENGINES, BOILERS, CONDENSERS, HEATERS, ETC.

Send for catalogue giving complete list.

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1—100 K.W. Westinghouse 550 Volts, 650 R.P.M., D.C. Generator, Compound Wound.....$400.00
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Address

Eastern Wisconsin Ry. & Lt. Co.

Colby-Abbot Bldg., Milwaukee, Wis.

250 Tons 9″ 90 lb. Grooved Girders
62 foot lengths

Unusually good condition. Very Low Price to Move Quick.
Have many other rail bargains.

ZELNICKER in St. Louis

Rails Machinery Equipment

POSITIONS WANTED

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CAR draftsman wishes position. Operating company preferred. Box 787, Elec. Ry. Jour.

PURCHASING agent wants position; 32 years of age and married. Eight years' experience with one of the largest street railways in America. Can furnish first class recommendations. Box 781, Elec. Ry. Jour.

STATION agent, experienced on steam and interurban roads, at present employed, desires better position. American and single. Can handle large stations to advantage. Freight station preferred. Box 790, Elec. Ry. Jour.

Get your Wants into the Searchlight

ADVERTISING RATES

Positions Wanted, Evening Work Wanted, 2 cents a word, minimum charge 50 cents an insertion, payable in advance.

Positions Vacant, Salesmen Wanted, Agencies, all undisplayed Miscellaneous ads, Machinery and Plants For Sale (with one line of display heading), 3 cents a word, minimum charge $1.50 an insertion.

All advertisements for bids cost $2.40 an inch.

Advertisements in display type cost as follows for single insertions:

1-16 page, $5.00	1 in. single col., $3.00
1-8 page, 10.00	4 in. single col., 11.60
1-4 page, 20.00	8 in. single col., 22.40

In replying to advertisements, send copies of testimonials, etc., instead of originals.

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TRACK foreman, roadmaster or engineer—Situation desired by graduate technical engineer experienced as foreman, inspector, chief clerk way and structures department, purchasing agent, twelve years' experience, nine with Stone & Webster; best references; hustler; salary desired $100 month. Box 769, Elec. Ry. Jour.

POSITIONS WANTED

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FOR SALE

FOR SALE CHEAP

Hewn, Heart, Cypress Trolley Cross Ties

We offer 10,000 pieces 6 x 8″ x 8′, hewn, heart, Cypress Ties, basis of 60c. per tie delivered New York City. For information address

GRESS MANUFACTURING CO.
18 Broadway, New York

The results of the best practice in electric railway work are recorded every week in the Electric Railway Journal

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Over 300 different products are here listed.

The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

Accountants.
Greims Corporation, H. E.

Acetylene Apparatus. (See Cutting Apparatus, Oxy-Acetylene.)

Acetylene Service.
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc., The.
Searchlight Co., The.

Advertising, Street Car.
Collier, Inc., Barron G.

Air Cleaners.
Lord Mfg. Co.

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Anchors, Guy.
Johns-Manville Co., H. W.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Automobiles and Busses.
Brill Co., The J. G.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles.
Brill Co., The J. G.
Cambria Steel Co.
Cincinnati Car Co.
National Tube Co.
Niles Car & Mfg. Co.
Standard Steel Works Co.
U. S. Metal & Mfg. Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
American General Eng'g Co.
Columbia M. W. & M. I. Co.

Badges and Buttons.
International Register Co., The
Western Electric Co.

Bankers and Brokers.
Halsey & Co., N. W.

Batteries, Dry.
Johns-Manville Co., H. W.
Western Electric Co.

Batteries, Storage.
Electric Storage Battery Co.
Esterline Co.
Western Electric Co

Bearings, Center.
Baldwin Locomotive Works.

Bearings and Bearing Metals.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G
More-Jones Brass & Metal Co.
Railway Specialties Corpn.

Bearings, Oilless, Graphite, Bronze & Wood.
Graphite Lubricating Co.

Bearings, Roller and Ball.
Railway Roller Bearing Co.

Bells and Gongs.
Brill Co., The J. G.
Electric Service Supplies Co.
Ohio Signal Co.
Reiter, G. C.
Western Electric Co.

Benders, Rail.
Niles-Bement-Pond Co.

Blow Torches for Soldering and Brazing. (See Cutting Apparatus, Oxy-Acetylene.)

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co.
Johns-Manville Co., H. W.

Boiler Coverings.
Johns-Manville Co., H. W.

Boiler Graphite.
Dixon Crucible Co., Jos.

Boiler Tubes.
National Tube Co.

Boilers.
Babcock & Wilcox Co.

Bond Clips.
Electric Railway Improv. Co.

Bond Testers.
American Steel & Wire Co.

Bonding Apparatus
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc., The.
Searchlight Co., The.

Bonding Tools.
American Steel & Wire Co.
Electric Railway Improv. Co.
Electric Service Supplies Co.
Ohio Brass Co.

Bonds, Rail.
American Steel & Wire Co.
Electric Railway Improv. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Roebling's Sons Co., John A.
Western Electric Co.

Boring, Tools, Car Wheel.
Niles-Bement-Pond Co.

Braces, Rail.
Kilby Frog & Switch Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Piling and Lumber.)
Electric Ry. Equip. Co.
Electric Service Supplies Co.
Lindsley Bros. Co.
Ohio Brass Co.
Western Electric Co.

Brake Adjusters.
Sauvage-Ward Brake Co.

Brake Shoes.
American Brake S. & Fdy. Co.
Barbour-Stockwell Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.
Railway Materials Co., The.

Brakes, Brake Systems and Brake Parts.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
Lord Mfg. Co.
National Brake Co.
U. S. Metal & Mfg. Co.
Westinghouse Traction Brake Co.

Brazing. (See Welding.)

Brooms, Track, Steel or Rattan.
Western Electric Co.

Brushes, Carbon.
Calebaugh Self-Lubricating Carbon Co.
Dixon Crucible Co., Jos.
General Electric Co.
Jeandron, W. J.
LeCarbone Co.
Morgan Crucible Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Brush Holders.
Railway Specialties Corpn.

Bumpers, Car Seat.
Electric Service Supplies Co.
Imperial Rubber Co.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.

Bunting.
Boyle & Co., Inc., John.

Bushings, Fibre.
Diamond State Fibre Co.

Bushings, Graphite & Wooden.
Graphite Lubricating Co.

Bushings, Rubber.
Imperial Rubber Co.

Bushings, Steel and Brass.
Railway Specialties Corpn.

Buttons. (See Badges and Buttons.)

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc., see those Headings.)

Car Trimmings. (For Curtains, Doors, Seats, etc., see those Headings.)

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Cincinnati Car Co.
Jewett Car Co.
Kuhlman Car Co., G. C.
Niles Car & Mfg. Co.
Wason Mfg. Co.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.

Castings, Composition or Copper.
Anderson M. Co., A. & J. M.

Castings, Gray Iron and Steel.
American B. S. & Fdry. Co.
American General Eng'g Co.
Columbia M. & W. & M. I. Co.
Falk Co.
Long Co., E. G.
St. Louis Steel Fdry.
Standard Steel Works Co.
Union Spring & Mfg. Co.

Castings, Malleable and Brass.
American B. S. & Fdry. Co.
American General Eng'g Co.
Long Co., E. G.

Catchers and Retrievers, Trolley.
Earll, C. I.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Long Co., E. G.
Lord Mfg. Co.
Ohio Brass Co.
Wood Co., C. N.

Ceiling, Car.
Pantasote Co.

Check Plates, Manganese Bronze.
Railway Specialties Corpn.

Cheese Cloth.
Boyle & Co., Inc., John.

Circuit Breakers.
Cutter Electrical & Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Clamps and Connectors, for Wires and Cables.
American General Eng'g Co.
Anderson M. Co., A. & J. M.
Electrical Engineers Equipment Co.
Electric Service Supplies Co.
Fargo Mfg. Co.
General Electric Co.
Klein & Sons, M.
Ohio Brass Co.
Standard Railway Supply Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Cleaners and Scrapers, Track. (See also Snow-Plows, Sweepers and Brooms.)
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.
Western Electric Co.

Cleats, Car Wiring.
General Electric Co.

Clusters and Sockets.
General Electric Co.

Coal and Ash Handling. (See Conveying and Hoisting Machinery.)

Coil Banding and Winding Machines.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Western Electric Co.

Coil Impregnation.
Vacuum Impregnating Wks.

Coils, Armature and Field.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Roebling's Sons Co., J. A.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines.
International Register Co., The
Johnson Fare Box Co.

Commutator Slotters.
American General Eng'g Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Wood Co., Chas. N.

Commutator Truing Devices.
American General Eng'g Co.
General Electric Co.

Commutators or Parts.
American General Eng'g Co.
Cameron Elec'l Mfg. Co.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
Western Electric Co.
Westinghouse Elec. & M. Co.

Compressors, Air.
Curtis & Co. Mfg. Co.
General Electric Co.
Westinghouse Trac. Br. Co.

"It's the Trial Set of LE CARBONE Brushes"

which means that this road is about to get acquainted with new brush economy.

Write for *your* set.

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Pittsburgh Office:
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Chicago Office:
1657 Monadnock Block,
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3242

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Weston

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They are shielded from the influence of external magnetic fields, the movement and magnetic system being enclosed in an iron case permanently mounted in a handsome wooden carrying-box with hinged cover.

The scale has a mirror over which the knife-edge pointer travels. Readings can be made within 1/10 of a division at any part of the scale.

In mechanical and electrical workmanship the Weston Model 45 Portable Ammeters and Voltmeters practically attain perfection.

A full description will be found in Bulletin 501, which will be mailed to you on request.

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SPRINGS COIL AND ELLIPTIC

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STORAGE BATTERY STREET CARS
THE ELECTRIC STORAGE BATTERY CO.
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Weather-Proof—Sun-Proof—Age-Proof
John Boyle & Co., Inc., 112 Duane St., New York
Branch House: 202-204 Market St., St. Louis, Mo. 1

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Condensers.
General Electric Co.
Westinghouse Machine Co.

Conduits, Flexible.
Fibre Conduit Co.

Conduits, Underground.
Fibre Conduit Co.
Johns-Manville Co., H. W.
Standard Underground Cable Co.
Western Electric Co.

Controller Regulators.
Electric Service Supplies Co.

Controllers or Parts.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Kerschner Co., Inc., W. R.
Westinghouse Elec. & M. Co.

Controlling Systems.
General Electric Co.
Westinghouse Elec. & M. Co.

Converters, Rotary.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Conveying and Hoisting Machinery.
Green Eng'g Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
Imperial Rubber Co.
International Register Co., The
Long Co., E. G.
Roebling's Sons Co., John A.
Samson Cordage Works.

Cord Connectors and Couplers.
Electric Service Supplies Co.
Samson Cordage Works.
Wood Co., Chas. N.

Cotton Duck.
Boyle & Co., Inc., John.

Couplers, Car.
Brill Co., The J. G.
Cincinnati Car Co.
Long Co., E. G.
Ohio Brass Co.
Westinghouse Trac. Brake Co.

Cranes. (See also Hoists.)
Niles-Bement-Pond Co.
Thew Automatic Shovel Co.

Creosoting. (See Wood Preservatives.)

Cross Arms. (See Brackets.)

Crossing Foundations.
International Steel Tie Co.

Crossing Signals. (See Signals, Crossing.)

Crossings, Track. (See Track, Special Work.)

Culverts.
Canton Culvert & Silo Co.

Curtains and Curtain Fixtures.
Brill Co., The J. G.
Electric Service Supplies Co.
Hartshorn Company, Stewart.
Pantasote Co., The.
Railway Supply & Curtain Co.

Cushions, Field Coil.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.

Cutting Apparatus, Oxy-Acetylene
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc., The.
Searchlight Co., The.

Derailing Devices.
Cleveland Frog & Crossing Co.
U. S. Metal & Mfg. Co.

Despatching Systems.
Northey-Simmen Signal Co., Ltd.
Simmen Auto. Ry. Sig. Co.
Western Electric Co.

Detective Service.
Wisch Service, P. Edward.

Door Operating Devices.
Electric Service Supplies Co.

Doors, Asbestos.
Johns-Manville Co., H. W.

Doors and Door Fixtures.
Brill Co., The J. G.
Electric Service Supplies Co.
Hale & Kilburn Co.

Doors, Folding Vestibule.
Electric Service Supplies Co.

Doors, Steel Rolling.
Kinnear Mfg. Co.

Draft Rigging. (See Couplers, Car.)

Drills, Track.
American Steel & Wire Co.
Electric Service Supplies Co.
Long Co., E. G.
Ohio Brass Co.

Dryers and Purifiers, Oil. (See Purifiers and Dryers, Oil.)

Dryers, Sand.
Zelnicker Supply Co., W. A.

Engineers, Consulting, Contracting and Operating.
Archbold-Brady Co.
Arnold Co.
Bemis, Anthony J.
Byllesby & Co., H. M.
Darlington, F. W.
Ford, Bacon & Davis.
Greims Corporation, H. E.
Gulick-Henderson Co.
Hovey, M. H.
Hunt & Co., Robert W.
Jackson, D. C.,, & Wm. B.
Richey, Albert S.
Roosevelt & Thompson.
Sanderson & Porter.
Scofield Engineering Co.
Stone & Webster Eng. Corp.
White Companies, J. G.
Woodmansee & Davidson, Inc.

Engines, Gas and Oil.
Westinghouse Machine Co.

Engines, Steam.
Westinghouse Machine Co.

Fare Boxes.
American General Eng'g. Co.
Brill Co., The J. G.
Cleveland Fare Box Co.
International Register Co., The
Johnson Fare Box Co.

Fences, Woven Wire, and Fence Posts.
American Steel & Wire Co.

Fencing, Wire.
American Steel & Wire Co.

Fenders and Wheel Guards.
Brill Co., The J. G.
Cincinnati Car Co.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Parmenter F. & W. G. Co.
Star Brass Works.
Western Electric Co.

Fibre
Diamond State Fibre Co.
Westinghouse Elec. & M. Co.

Fibre Tubing.
Diamond State Fibre Co.
Fibre Conduit Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & M. Co.

Field Coils. (See Coils.)

Filters, Water.
Scaife & Sons Co., Wm. B.

Fire Extinguishing Apparatus.
Imperial Rubber Co.
Johns-Manville Co., H. W.
Pyrene Mfg. Co.

Fire-proofing Material.
Johns-Manville Co., H. W.

Fittings, Malleable, Cast Iron & Brass.
National Tube Co.

Flooring, Composition.
American Mason Safety T. Co.
Johns-Manville Co., H. W.
Western Electric Co.

Forgings.
Electric Materials Co., The.
Standard Steel Works Co.

Furnaces. (See Stokers.)

Fuses and Fuse Boxes.
American General Eng'g Co.
Chicago Fuse Co.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Johns-Manville Co., H. W.
Western Electric Co.
Westinghouse Elec. & M. Co.

Fuses, Refillable.
Columbia M. W. & M. I. Co.
Johns-Manville Co., H. W.

Gaskets.
Diamond State Fibre Co.
Imperial Rubber Co.
Johns-Manville Co., H. W.
Power Specialty Co.

Gas Producers.
Westinghouse Machine Co.

Gates, Car.
Brill Co., The J. G.
Cincinnati Car Co.
Jewett Car Co.

Gauges, Oil and Water.
Ohio Brass Co.

Gear Blanks.
Diamond State Fibre Co.
Standard Steel Wks. Co.

Gear Cases.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Kerschner Co., Inc., W. R.
Westinghouse Elec. & M. Co

Gears and Pinions.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Diamond State Fibre Co.
Electric Service Supplies Co.
General Electric Co.
Kerschner Co., Inc., W. R.
Long Co., E. G.
Nuttall Co., R. D.

Generators, Alt.-Curent.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Generators, Dir.-Current.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Gongs. (See Bells and Gongs.)

Gongs, Rotary Foot.
Reiter, G. C.

Graphite.
Dixon Crucible Co., Jos.
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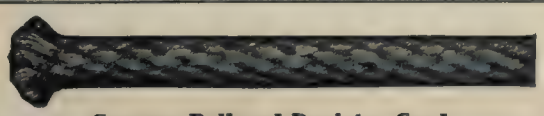

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Printing begins on Tuesday of each week.
Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.
New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.
If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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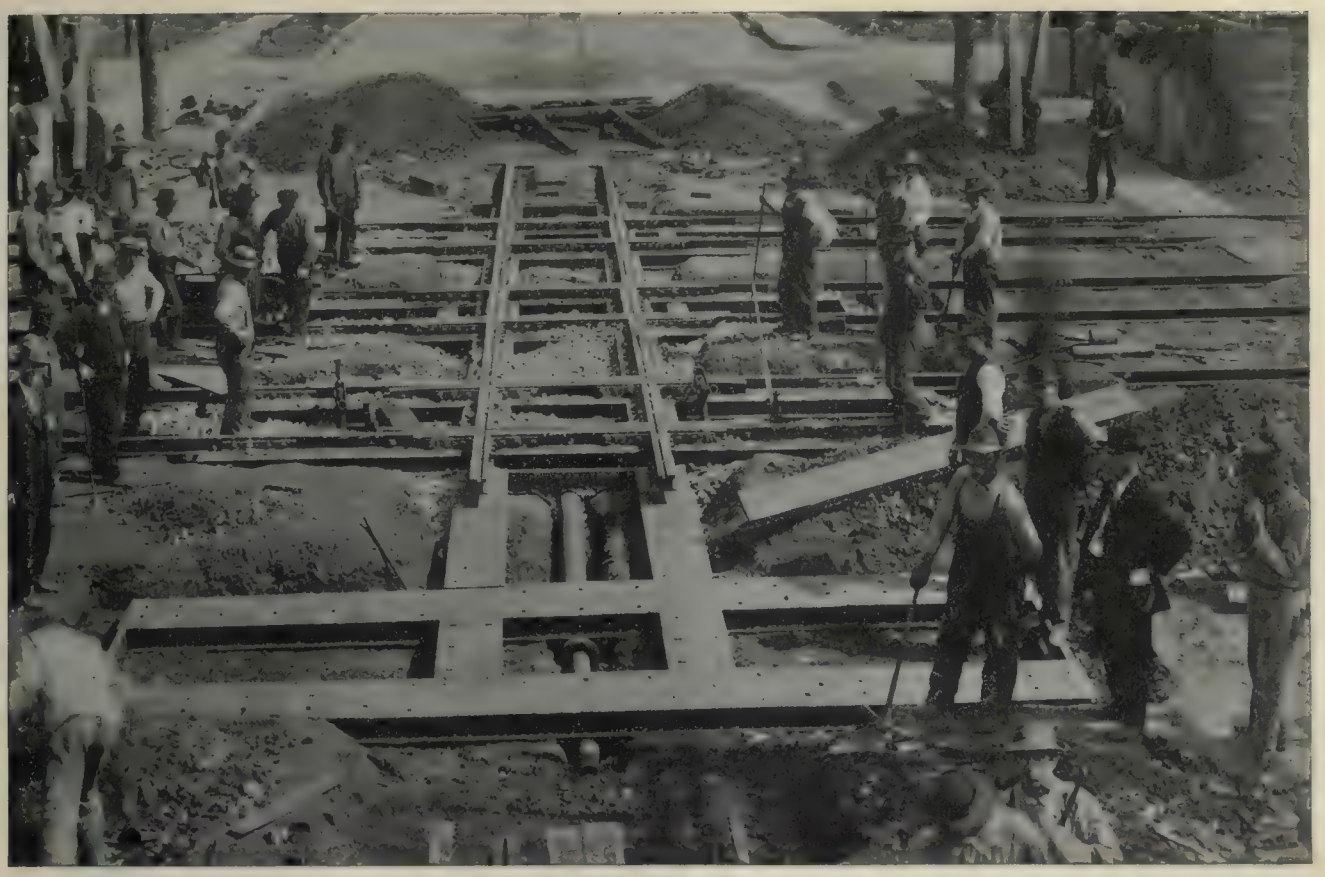


Four Track Crossing, During Installation, on Steel Substructure at Lorain, Ohio. Intersection of Cleveland, Southwestern & Columbus Railway with the N. Y., C. & St. L. R. R.

You Save All Along the Line

when you use

INTERNATIONAL

Steel Twin Ties

To a great extent rail wear is due to faulty tie support. At its best, wood cannot stand great longitudinal and transverse stresses without giving sufficiently to start trouble. Permanent anchorage is impossible with wooden ties. Permanent alignment is just as impossible. And wooden ties rot—sooner or later.

Steel ties hold the entire track literally in a grip of steel. There is no spreading of the rails, no creeping, and minimum possibilities for battered joints. Hence, rail wear is reduced to a minimum.

With these steel tie advantages goes tie permanency. Steel ties do not rot nor deteriorate. They are long-life adjuncts to track maintenance.

Steel Crossing Foundations

Increase the life of grade crossings, and by reducing the maintenance charges to a minimum greatly decrease the charges against crossings which they support.

They are not an experiment. They are a demonstrated success. They have stood up under the severest service at the most troublesome points of the largest steam and electric railways, and are prolonging the life of the special work far beyond expectations.

In nearly every instance where International Steel Crossing Foundations have been installed duplicate installations are being made all along the line as fast as new crossing installations are needed. This is a significant fact that should prompt you to investigate the merits of these foundations.

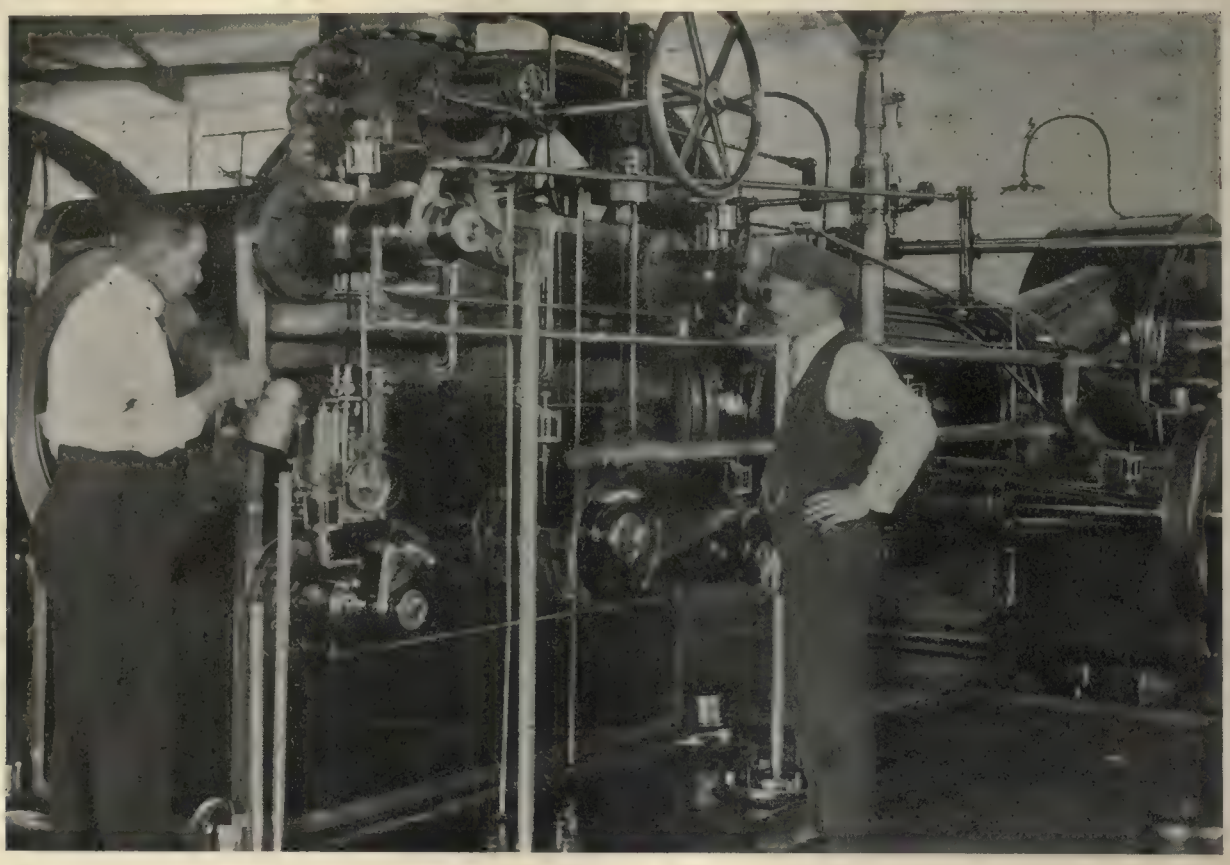
Steel Twin Ties for paved streets and Steel Foundations for grade crossings are acknowledged to be the last word in Modern track construction. Do you want additional facts? Write for them.

International Steel Tie Company

General Sales Office and Works: Cleveland, Ohio

REPRESENTATIVES

Parrott & Company, San Francisco, Cal. Los Angeles, Cal.
Western Eng'g Sales Co., Seattle, Wash. Portland, Ore.
R. J. Cooper Co., Salt Lake City, Utah
J. E. Lewis & Co., Dallas, Texas.
Maurice Joy, Philadelphia.
William H. Ziegler, Minneapolis, Minn.



The Heart of the Prime Mover

is at the oil reservoir.

And the quality of the oil that makes up the circulation has about the same effect on efficiency as the quality of blood in human circulation.

That part of the matter is settled by adopting Galena oils.

Then the Galena experts without charge, work with your men to bring oiling methods up to the highest state of efficiency.

Result: The economy stipulated in the Galena contract.

Get all the details of economies we guarantee to produce for your road.

Galena-Signal Oil Co.

Franklin, Pa.

3153

LIGHT-WEIGHT STEEL INTERURBAN CARS

AN admirable type of interurban for lines serving a thickly populated region requiring frequent stops is the above car, which is one of an order of ten lately built by the Wason Manufacturing Company for the Shore Line Electric Railway Company's Division between New London and Willimantic, Connecticut. Sixteen cross seats and longitudinal seats occupying the space of three windows at the corners accommodate 56 passengers. The length over the body is 36 ft., and over the vestibules, 45 ft. 5 in.

The weight of the body is 16,550 lb.; electrical equipment, including motors, 11,900 lb.; air brake equipment, 1,500 lb.; pair of Brill 27-MCB1 trucks, 14,000 lb.; making a total weight of 47,650 lb.

In the underframe, the wider flange of the side sills is placed horizontally to provide ample surface to attach the crossings without the use of gusset plates, except at the corners. Side girders carry the load and are composed of 3/32-in. sheet steel reinforced at the top with a flat bar belt rail and by the T-posts which frame the upper structure.

Brill tandem-sash semi-convertible windows with their extra large window openings provide a bright interior in winter and a practically open car in summer.

THE J. G. BRILL COMPANY
Philadelphia, Pa.
AMERICAN CAR COMPANY
St. Louis, Mo.
G. C. KUHLMAN CAR CO.
Cleveland, Ohio
WASON MANUFACTURING CO.
Springfield, Mass.
COMPAGNIE J. G. BRILL
Paris, France

AGENCIES: PIERSON, ROEDING & Co., San Francisco, Los Angeles, Portland, Seattle. NOYES BROTHERS, Melbourne, Sidney, Dunedin, Brisbane, Perth. C. DUBBELMAN, 48 Rue du Luxembourg, Brussels. SHACKLEFORD & Co., Calle San Martin 201, Buenos Aires. THOMAS BARLOW & SONS, Durban, Natal. SHEWAN, TOMES & Co., Hong Kong, Canton, Shanghai. G. CHECCHETTI, Piazza Sicilia, 1, Milan. LONDON OFFICE, 110 Cannon Street, E.C.

G-E Motor Generator Sets

The success of the commutating pole generator on G-E motor generators used in heavy railway service is well known.

For extremely heavy service the G-E Generators are now equipped with compensating pole-face windings.

The Butte, Anaconda & Pacific, the Chicago, Milwaukee & St. Paul and the Eastern Michigan Power Company motor generators are notable examples of this type.

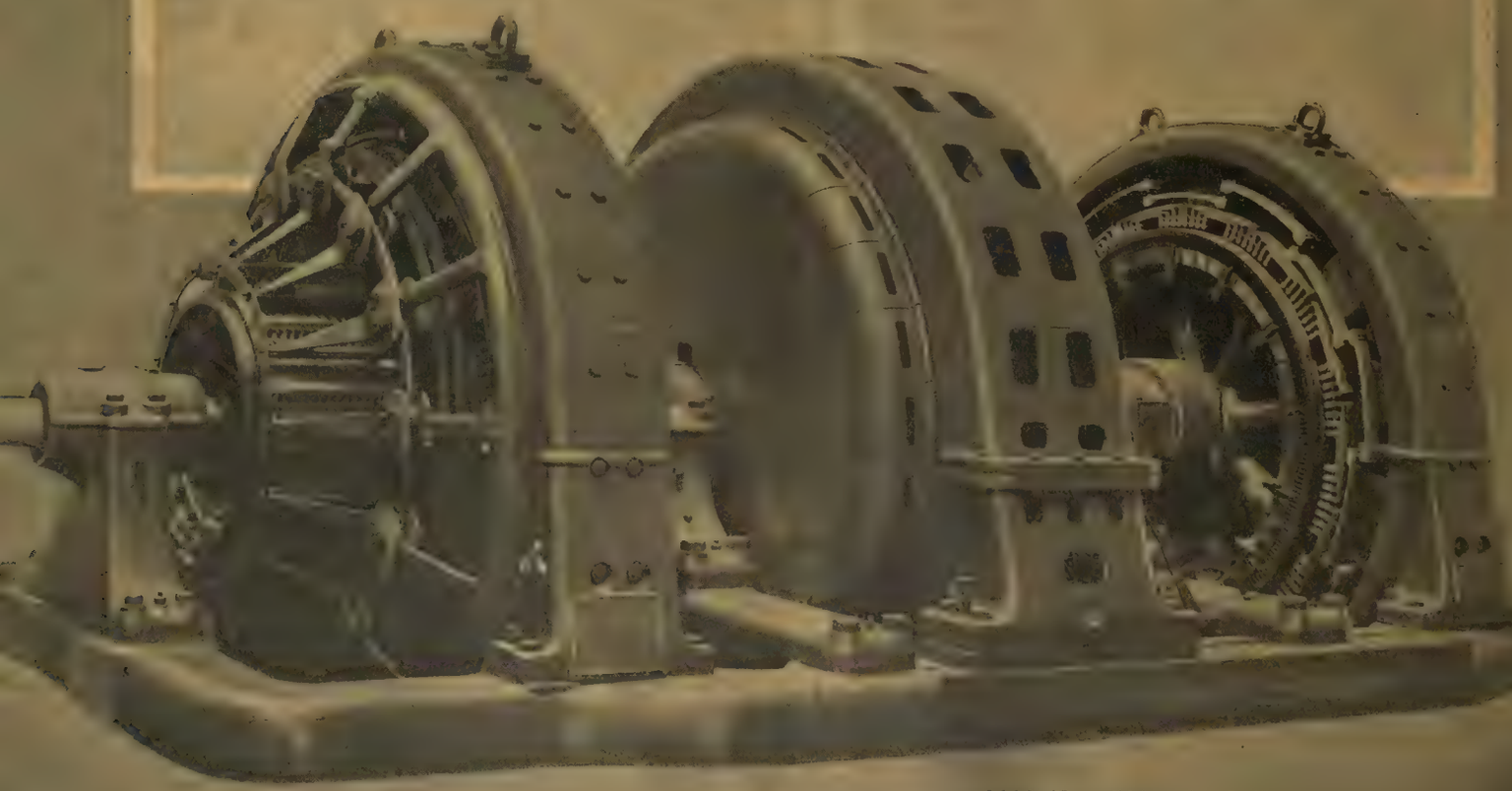
Other G-E motor generator sets recently built for railway service are as follows:

Utah Railway & Lt. Co.	1	1500 Kw.
San Diego Elec. Rwy. Co.	2	1500 Kw.
Canadian Northern Rwy. Co.	2	1500 Kw.
North Western Pacific Co.	1	1000 Kw.
Dallas Elec. Lt. & Pr. Co.	1	1000 Kw.
Pacific Elec. Rwy. Co.	8	1000 Kw.
Puget Sound Trac. Lt. Ht. & Pr. Co.	1	1000 Kw.
Republic Rwy. & Lt. Co.	1	1000 Kw.
Ft. Wayne & No. Indiana Trac. Co.	1	1000 Kw.

General Electric Company

General Offices:
Schenectady, N. Y.

Sales Offices
in all large cities

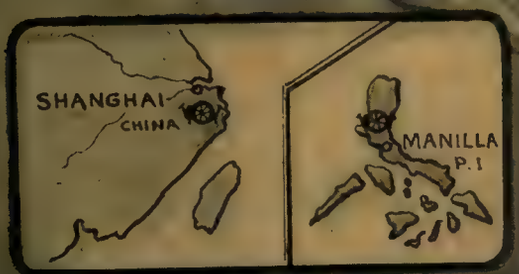


3300 Kw. 500 volt G-E Motor Generator Set now operating in Crown Mines, South Africa

ELECTRIC RAILWAY JOURNAL

Volume 46
Number 4
July 24, 1915

McGraw Publishing Co., Inc.



Track rejuvenation by the Reciprocating Method

is standard practice from Maine to California.

Any method which secures such nation-wide adoption must be sound.

Investigate this method and the

RECIPROCATING GRINDER

which has made track and joint grinding practicable.

Write us for cost-data and opinions from Railway Companies operating one to twelve machines.

Railway Track-work Co.
Heed Building
Philadelphia, Pa.

No. 548-A

75 HP at
500 Volts
90 HP at
600 Volts

Weight
Complete
3125 lbs.

WESTINGHOUSE
ELECTRIC

An Achievement in Rwy. Motor Design

Designed for Interurban Service—Note the light weight for this capacity, obtained without impairing the strength of any part.

Mechanically and Electrically up-to-the-minute in design. Internally ventilated by the most effective scheme known to the art.

Liberal overload capacity, with perfect commutation, secured with correctly proportioned commutating poles, main fields and armature.

Leaflet No. 3836 gives details.

Westinghouse Electric & Manufacturing Co.

East Pittsburgh, Pa.

Sales Offices in all Large Cities.

Electric Railway Journal

New York, July 24, 1915

Volume XLVI No. 4

Contents

Pages 133 to 172

Long Island Railroad Adopts Light, Steel Trailers 136

These cars are intended for summer use exclusively. A description, with illustrations, is given of the unusual features which are provided for combining strength with lightness.

ELECTRIC RAILWAY JOURNAL, July 24, 1915. 4½ cols. Ill.

Railway Power Rates in Chicago 138

The unit cost for energy, which had been adopted under the terms of the 1913 contract, has been increased due to a decreasing load factor.

ELECTRIC RAILWAY JOURNAL, July 24, 1915. 1½ cols. Ill.

Pittsburgh Railways Claim Department 139

A co-operatively functional type of organization, with the five separate bureaus, has been built up by this company to secure the greatest degree of efficiency and to facilitate the settlement of claims. Details of the various systems which are used are published.

ELECTRIC RAILWAY JOURNAL, July 24, 1915. 14 cols. Ill.

Employees Receive Increase in Chicago 146

A reduction in the number of years to reach maximum wages is also made by the decision of the arbitrators. James M. Sheean, the company's representative, files a dissenting opinion. The company defines its position through the medium of an advertisement in Chicago papers.

ELECTRIC RAILWAY JOURNAL, July 24, 1915. 6¼ cols.

American Association News 150

Director of Transportation McConnaughy gives further details regarding special trains for the San Francisco convention. Manila company section held meeting on June 1. T. & T. Association committee discusses uniform definitions.

ELECTRIC RAILWAY JOURNAL, July 24, 1915. 2 cols.

Equipment and Its Maintenance 152

Portable Car Testing Set—*By D. D. Ewing.* An Inexpensive Method of Treating Boiler Feed Water—*By T. R. Crumley.* Bearing-Babbitting Furnace—*By J. C. Donovan.* A New Type of Catenary Hanger—*By W. H. Creviston.* Novel Contact Rail Installation in England. Inexpensive Drinking-Fountain Guard. Paste Filler for Commutator Slots. Improvements in Des Moines Interurban Cars. Rear Wheel Fenders for New York Buses. Oil Knife Switches. Prepayment Car Apparatus. Ground-Wire Disconnector.

ELECTRIC RAILWAY JOURNAL, July 24, 1915. 14 cols. Ill.

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FRICTION

(Its relation to efficient brake control of moving trains)

FRICTION IS A RETARDING FORCE IN SOCIETY, POLITICS, BUSINESS AND RELIGION.

BUT FRICTION REPRESENTS A CURIOUS PARADOX IN THE VARIOUS FIELDS OF ENGINEERING AND MECHANICS. IT IS AT ONCE ESSENTIAL TO EFFICIENCY AND OPPOSED TO IT. PRACTICALLY ALL APPLICATIONS OF POWER DEPEND FINALLY UPON FRICTION; ALSO ALL POWER APPLICATIONS ARE SUBJECT TO SERIOUS LOSSES DUE TO FRICTION.

A RAILROAD TRAIN IS PECULIAR IN THAT WHILE ACCELERATION—THE HAULING CAPACITY OR TRACTIVE EFFORT OF THE LOCOMOTIVE—DEPENDS FUNDAMENTALLY UPON FRICTION—(WHEEL—RAIL); DECELERATION—BRAKE CONTROL OF ALL TRAIN MOVEMENT—ALSO DEPENDS FUNDAMENTALLY UPON FRICTION (WHEEL—SHOE).

ON THE ONE HAND WE HAVE HEAVY TRAINS AT HIGH SPEEDS REPRESENTING UNBELIEVABLE TOTALS OF FOOT TONS OF ENERGY; ON THE OTHER HAND WE HAVE, TO CONTROL THIS MOVING MASS, THE FRICTION OF A FEW SQUARE INCHES OF BRAKE SHOE IN CONTACT WITH A ROTATING WHEEL.

BRAKE SHOE FRICTION AND TRAIN RETARDATION RESULTING THEREFROM VARY WITH LEVERAGE. PRESSURE, TEMPERATURE, DURATION OF CONTACT, LOCATION OF BRAKE SHOE ON WHEEL, BRAKE MECHANISM DESIGN INVOLVING ABILITY TO ALTERNATE AND GRADUATE BRAKING POWER ON THE TRAIN, AND A HUNDRED OTHER FACTORS WHICH ENTER INTO THIS MOST COMPLEX AND INVOLVED BRANCH OF AIR BRAKE ENGINEERING.

AIR BRAKE ENGINEERING IS MAINLY CONCERNED WITH THE FLEXIBLE, RELIABLE AND EFFECTIVE APPLICATION OF FRICTION TO PROPERLY CONTROL ALL TRAFFIC MOVEMENT BY RAIL.

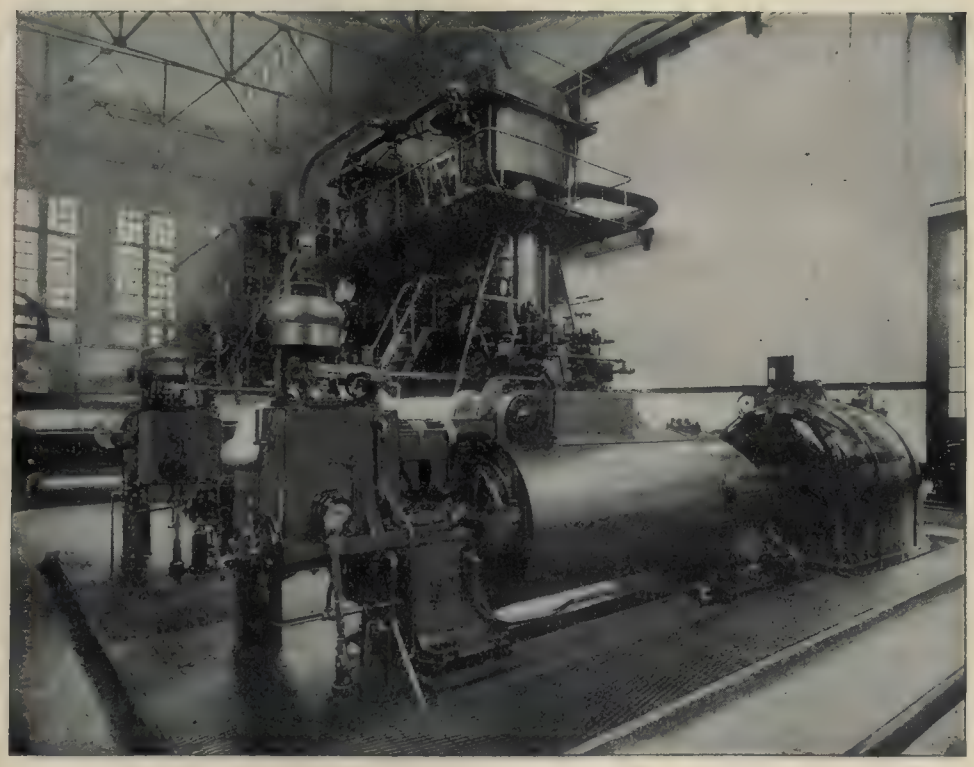
Suggested by the

Westinghouse Traction Brake Company

Works: Wilmerding, Pennsylvania

PITTSBURGH: Westinghouse Building — NEW YORK CITY: City Investing Building
CHICAGO: Railway Exchange Building — ST. LOUIS: Security Building

32 Months Without a Stop



Two years and eight months without steam being turned off at the throttle is the record made by one of our 500 kw. Condensing Turbines in the plant illustrated.

During this time the Turbine carried the regular plant load. Upon being shut down, it was found to be in good condition and immediately put back into service.

Westinghouse Electric & Manufacturing Co.

East Pittsburgh, Pa.

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
Bluefield, W. Va.
Boston, Mass.
Buffalo, N. Y.
Butte, Mont.
Charleston, W. Va.
Charlotte, N. C.
Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio
Columbus, Ohio
*Dallas, Tex.
Dayton, Ohio
Denver, Colo.
Detroit, Mich.
*El Paso, Tex.
*Houston, Tex.
Indianapolis, Ind.
Joplin, Mo.
Kansas City, Mo.
Louisville, Ky.
Los Angeles, Cal.
Memphis, Tenn.
Milwaukee, Wis.
Minneapolis, Minn.
New Orleans, La.
New York, N. Y.
Omaha, Neb.
Philadelphia, Pa.
Pittsburg, Pa.
Portland, Ore.
Rochester, N. Y.
St. Louis, Mo.
Salt Lake City, Utah
San Francisco, Cal.
Seattle, Wash.
Syracuse, N. Y.
Toledo, Ohio
Washington, D. C.

*W. E. & M. Co. of Texas

PUBLISHER'S PAGE

Buy, Boom and Use Advertised Products Because:

3

Advertising Conserves the Buyers' Time

Universities are teaching the science of salesmanship, volumes have been written on every phase of merchandising, but literature on the art of buying seldom, if ever, sees the light of day.

There is an art of buying just as there is a science of selling. Buying may be done efficiently. Shrewd buyers know that the cost of buying is as necessary a charge as the price of the commodity purchased.

The time consumed in investigating a product and in the negotiations leading to purchase cost money, and it is this cost that advertising helps to reduce.

This follows because he who knows most about the products that he is called upon to specify or purchase wastes less time in choosing when buying time comes.

Therefore, he who, through the regular reading of advertisements relating to his business, becomes familiar with the products in his line is almost ready at once to say what should be bought.

This preliminary knowledge is gained in leisure time and, therefore, at lower cost than when it has to be gained speedily after a decision is needed.

There is no practicable substitute method for keeping in touch with a field to take the place of persistent, thoughtful advertisement reading.

It's a habit that makes for efficient economy.

Make the most of it.

This is part of a series that discusses the buyers' interests in connection with advertised products under headings outlined in our issue of July 3, page 6.

READ THE SERIES — APPLY IT—

Buy, Boom and Use Advertised Products

It's up to YOU

Good management alone can produce good service. In this the "human element" governs the degree of success attained—BUT

It's up to SIGNALS

—automatic signals to protect your **good** service with **safe** service—
because the "human element" is a **dangerous** factor in operation.

If for no other reason than sound executive policy you ought to use **automatic** electric signals of some kind. The better the signal the better the service. Of course we urge you to install U. S. Electric signals because the majority of signalled roads have found that they better meet demands.
It's up to you.

U.S. ELECTRIC SIGNAL CO. WEST NEWTON, MASS.

United States Electric Signal Co.
West Newton, Massachusetts

Foreign Representatives
Quilliam Brothers, Cleggs Court, Chapel Street, Salford, England

JOHNS-MANVILLE SERVICE
COVERS THE CONTINENT

Service is the dominating idea in business today.

It may be noticeable in the attitude of mercantile houses of all sorts. The store that once sold merchandise, for instance, on a "get your money" basis now finds it profitable to sell it on a "keep your business" basis.

The extent to which this is carried by a concern is always a mark of its efficiency to itself and its value to you as a buyer.

Johns-Manville Service is conducted on a "keep your business idea" by offering real live help and products that mean saving rather than expense. It adds to that the responsibility for the product's performance; it assumes the risk. Johns-Manville Service is similar to the idea cited above—only it is more important because it concerns your business. What could be more vital than that in a commercial sense?

The Word "Noark" on a Fuse is your assurance of positive Fuse Safety.

Mark Twain said "There are no tolerable eggs"; by inference, he said "They were either good or bad." Analogously, there is only one kind of safety to strive for, and that is *positive safety.*

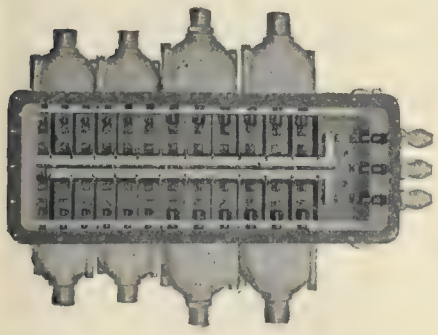
The "Noark" Fuse is positive safety bound up in a cartridge. Before it is blown, it is worth the price paid for it, but in a period of stress its value becomes as great as the machinery it protects.

After all, of what importance is the price of a fuse—compared to the value it represents in protection.

We have real reasons for stating that "Noark" Fuses are the best, reasons that are very evident on examining the fuse.

Order a set, try them out on your circuits. All voltages, all amperages, all types.

The "Noark" Subway Box makes the Junctions the strongest points in the underground distribution.



If there is any one place where orderly arrangement, safety and reliability should be found, it is at the junction of cables, underground.

Ease in detecting trouble, making tests and reliability under all subterranean conditions are features that figure into maintenance costs.

An ideal subway box is one that makes the junction point stronger than any other part of the distribution, and that offers an impregnable barrier to flooded conditions and the action of inflammable gases. A box that is easy to install and has provided for such practical time savers as deep welled lugs for the easy sweating of cables, well designed pot heads, full-cut threads for good electrical contact and accessibility to all bus and cross bars.

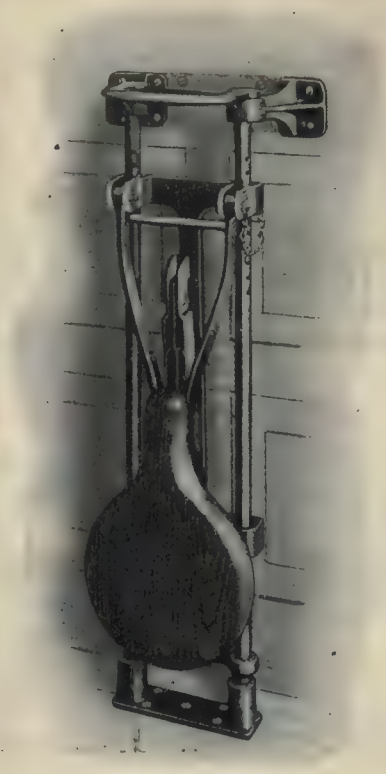
All these considerations and more are cared for in the design and construction of "Noark" Subway Boxes, and users tell us so. Let us quote you on those you need.

H. W. JOHNS-MANVILLE CO.

Manufacturers of Service, Subway and Transformer Boxes; Fuses; Line Material; Insulating Materials; Fibre Conduit; Fireproof Wood; Friction Tapes; Dry Batteries; Lighting Systems, Etc.

Akron	Boston	Columbus	Duluth	Kansas City	Minneapolis	Philadelphia	St. Paul	Toledo
Albany	Buffalo	Dallas	Galveston	Los Angeles	Newark	Pittsburgh	Salt Lake City	Washington
Atlanta	Chicago	Dayton	Houghton	Louisville	New Orleans	Portland	San Francisco	Wilkes-Barre
Baltimore	Cincinnati	Denver	Houston	Memphis	New York	Rochester	Seattle	Youngstown
Birmingham	Cleveland	Detroit	Indianapolis	Milwaukee	Omaha	St. Louis	Syracuse	

THE CANADIAN H. W. JOHNS-MANVILLE CO., LTD., Toronto, Winnipeg, Montreal, Vancouver 3131A-3096



Here's the New Keystone Motorman's Seat

The striking point of advantage in this new Keystone Motorman's Seat is in the fact that the seat proper with its vertical rods and collapsible support may be easily removed from its supporting bracket and floor plate and transferred from one end of the car to the other.

Or seats may be interchanged among any number of cars, it being necessary merely to provide a floor plate and bracket on each end of each car. **The advantages of this arrangement will be readily apparent.**

Keystone Seats when in use are so placed as to be in proper relative position for operation of the controller and brake valve, and arranged so that the motorman may readily operate the foot gong or a foot valve from his sitting position. They are exceptionally strong, being made entirely of malleable iron and steel parts, with the seat proper of wood, and are suitable for the most severe service.

They are adjustable in distance from the floor for men of various heights, and are instantly collapsed by simply giving the under supporting rod a kick with the foot—the motorman's attention not being taken from his work for even an instant.

Every refinement you want in a motorman's seat you get in the Keystone. Every condition you have to meet can be met with the Keystone. It is **the** seat for service and satisfaction.

Let us give you further details and quote prices which are very attractive.

ELECTRIC SERVICE SUPPLIES CO.

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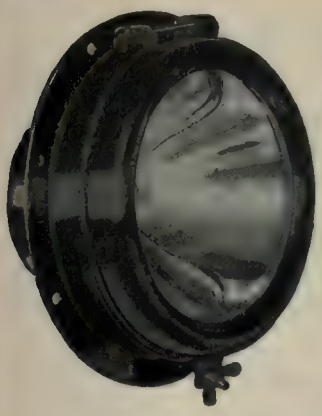

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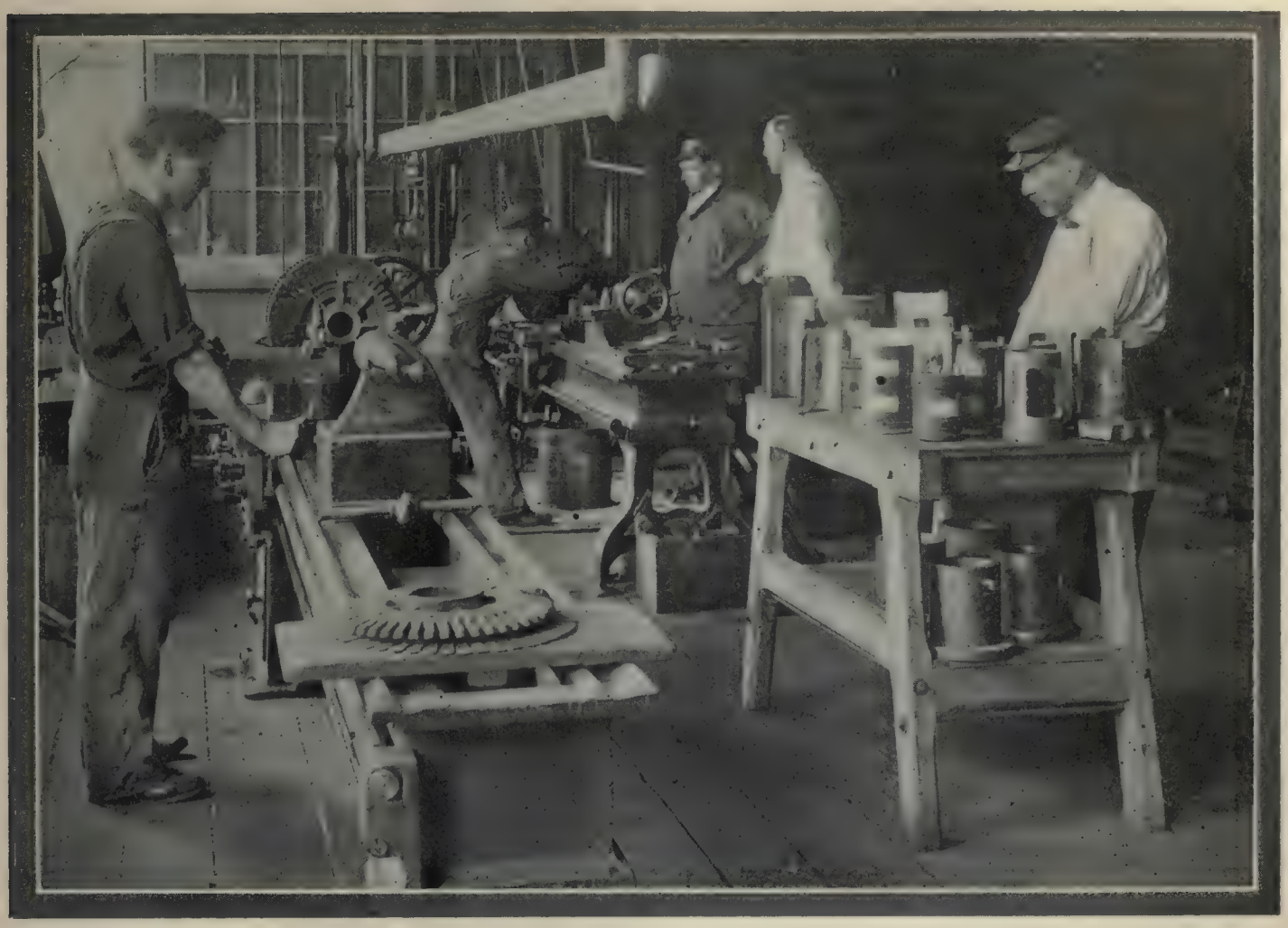

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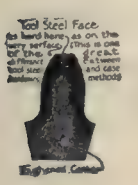

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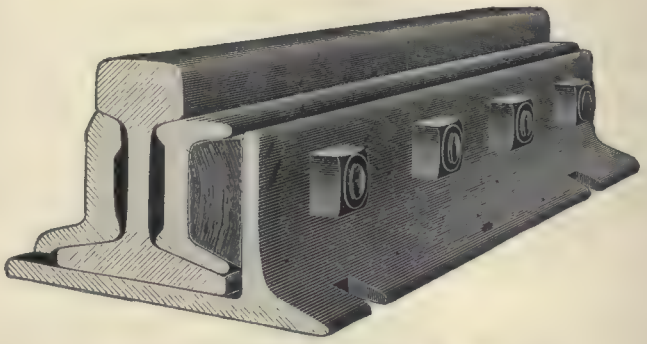

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Electric Railway Journal

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The arc is taken by a copper tip of generous proportions, riveted to the finger proper. This contact piece can be easily renewed at small expense, making a complete new finger unnecessary.

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Electric Railway Journal

Published by the McGraw Publishing Company, Inc.

Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLVI NEW YORK, SATURDAY JULY 24, 1915 No. 4

OUTDOOR SUBSTATION DESIGN

Outdoor substations are advantageous from several points of view in electrical distribution systems of moderate voltage. Low cost is one of the chief merits of this class of construction where the line potential does not run up much above 22,000 volts; but economy of investment may be pushed too far. There is room for improvement in some cases, notably in connection with the arrangement of circuits with respect to adjacent structures such as metal stacks; in the provision of wider clearances between lines of different voltage, and in the facilities for disposing of transformer oil in case it has to be drained out of the casings under emergency conditions. In this case a small outlay for pipe connections to a sewer or to a point of discharge at a safe distance from near-by buildings is well made. At least two entrances to the inclosure containing the transformer and oil switch banks are desirable in case trouble in one part of the installation threatens to cut off ingress and egress in entire safety, and the best mechanical construction for pole fixtures is none too good even in an outdoor substation designed for operation at 11,000 volts and over. Double cross-arms, well-secured strain insulators, clean-cut runs of wiring and adequate space around the bases of transformer and switch casings are worth all they cost, and the interests of both safe and convenient operation call for a standard of engineering design and construction not always appreciated by those who erect these structures. In fact, the margin between good work and a down-at-the-heels installation is too small to justify excessive economies in these plants.

LOCOMOTIVE COAL CONSUMPTION

In the discussion on W. S. Murray's paper on the New Haven Railroad's operating costs which was published in abstract in last week's issue, the statement that the steam locomotive required twice as much coal as the electric machine seemed to be something in the nature of a storm center. The problem presented is, of course, decidedly involved, but from such evidence as has been made available the electric locomotive requires some 2.5 lb. of coal for every horsepower-hour produced at the drawbar, making the steam locomotive consume 5 lb. if Mr. Murray's basis of comparison is accepted. As opposed to this there were cited in the discussion the results from a number of laboratory tests in which the coal consumption of a steam locomotive ranged from 5 lb. all the way down to 2.5 lb. per horsepower-hour. However, the laboratory test of a locomotive can hardly be accepted as equivalent to road conditions. In the first place, no standby losses are included. In the second place, the laboratory test gives the coal consumption at a fixed cut-off, a condition that does not exist in practice. As a matter of fact, the most economical loading is that under which the steam locomotive is loaded right up to its limit so that it works at full cut-off on the ruling grade, and this condition would not be likely to produce a coal rate much less than 5 lb. of coal per horsepower-hour even aside from standby losses. Unfortunately, the different characters of the respective services do not permit accurate comparisons of the coal consumption for the steam and electric locomotives on the New Haven Railroad. However, it is of certain interest to note that the annual coal consumption is about 1,800,000 tons, while the ton-mileage is of the order of ten billions, making a rough average figure of 0.36 lb. of coal per ton-mile. As the average power consumption for the electric locomotives is close to 60 watts per ton-mile, this gives a coal consumption of 0.165 lb. per ton-mile, or actually less than half of that of the steam locomotives.

THE CHICAGO ARBITRATION AWARD

The Chicago arbitration decision will be a disappointment to all who believe in the principles of real arbitration. We expressed the hope at the time the arbitrators were selected that the verdict would not be a mere compromise on the questions at issue but would be based on the merits of the case. But the decision shows that the majority of the board did not take into consideration either the average wages paid for the same work elsewhere or the average wages paid in the building trades and similar trades in Chicago. We see no excuse for a decision, supposed to be fair for both sides, which gives wages higher than those in other large cities east of the Rocky Mountains, when the evidence at the hearing showed that the cost of living is less in Chicago than in St. Louis, Detroit, Cleveland, New York, Pittsburgh, Philadelphia or Boston, the latter city exceeding Chicago by more than 27 per cent. Nor is there any logic in the requirement that the company should pay its trainmen so much more than skilled workmen in Chicago earn in such lines as the carpenter trade, as shown in the statement of Mr. Sheean, or the wages paid to the employees of the city itself in such duties as foremen in the street department, officers in the health department, laborers, motor drivers, etc. An unfortunate feature of the arbitration was the action of the Mayor in taking independent testimony during the hearing by calling in some 200 employees whose wages were directly involved in the arbitration, and questioning some himself and having others questioned by represent-

atives of the corporation counsel's office with reference to the issues involved, without the principals being present or represented. If such action had been taken in a jury trial, and some of the jurors had listened to evidence independently of the other jurors, the case would be thrown out of court, and according to the Illinois Supreme Court action of this kind is equally improper in an arbitration hearing. Nevertheless, the company has announced that it would accept the decision and carry out its provisions faithfully, and it has appealed to the public and the trainmen to co-operate with the management in every way possible to give a better service than ever before. This attitude should command the support of the public in Chicago, and as the city is a partner in the profits of the surface lines to the extent of 55 per cent, it has a vital interest in their financial success. Some of the broader questions raised by the decision of the arbitration board in Chicago are considered in an editorial on the opposite page.

UNEVEN WEAR IN INSERT SPECIAL WORK

Perhaps the principal criticism to be made against the general use of insert special work is the uneven wear which predominates, particularly in insert work in curves over which a dense heavy service is operated. Here the manganese steel insert and the rolled rail or cast-steel arms of frogs are subjected to excessive wear, and the insert, being made of a metal of high abrasion resisting qualities, does not wear as rapidly as the arms. Frequently rather serious variations in the curve alignment occur, due to excessive flange wear, and coincident with this the insert surface is found to be above that of the adjoining rails. Where this takes place, uniform wear throughout the layout is, undoubtedly, desirable. To obtain it, heavy traffic curves should be laid with one kind of material, either open-hearth steel rails and special work throughout or solid manganese steel rails and special work. Some engineers, however, have been successful in obtaining uniform wear and reasonably long life, even where the rails join manganese steel special work, by specifying a high carbon content. If this produces the desired result, it should be practised particularly where greater economy may be obtained by reason of the low first cost.

Frequently the question is raised as to the value of renewable as opposed to non-renewable inserts. No doubt some engineers draw the conclusion that renewable inserts are useless because the work of renewing them is difficult, especially when the frog arms have become considerably worn. This objection is well founded, but other more important reasons govern the use of renewable inserts. We believe that track engineers generally favor this type of insert because it permits replacements in case an insert fails early in the life of a frog or crossing and because the insert can be reset in the field if it should become loose under traffic. These two advantages of the renewable insert are certainly sufficient to make it economically desirable. In many instances where the company's repairmen have become skilled in resetting the various types of inserts, success in replacing is obtained even where they are badly worn. On the other hand, most insert renewals due to excessive wear are in right-angle crossings. In these the wear on the running rails is slight while that due to impact blows at the intersecting flangeways is great.

In all cases where inserts are renewed, the tolerances in the setting should be measured to provide for thinner plates when necessary. It is possible, however, where the variation is slight, to surface the insert with a grinder after it has been set in position. In connection with the renewability of inserts, it must also be borne in mind that although this is a desirable quality, the fastenings can be such as to make replacements too easy. This may reduce the effectiveness of the fastenings which, in turn, may shorten the service life of the piece. To guard against a weakness of this kind, track and roadway engineers should not specify that their insert fastenings should be designed to make replacements easy, but should insist primarily on a design which will hold the insert secure.

SPARKING AND FLASHING IN RAILWAY MOTORS

The very interesting study of motor commutation by R. E. Hellmund, printed in last week's issue of this paper, must have served to remind users of railway motors of the fact that present conditions in this line are in marked contrast to those of the early days. In the light of the present knowledge of the causes of sparking and flashing the younger generation of master mechanics may have difficulty in realizing how progress was made step by step. The three big and conspicuous steps in this progress were these: The introduction of the carbon brush; the application of saturation in the magnetic circuit to control flux displacement by armature magnetomotive force, and the introduction of the commutating pole. Smaller intermediate steps involved details of design incident to all progress.

The railway motor is inherently inclined to good commutation because, being a series motor, its flux increases with the load. Hence armature reaction, the bane of good commutation, has less effect than in shunt machines because the armature teeth become saturated under heavy load and limit flux distortion. On the other hand, necessary reversibility in direction of rotation prevents the shifting of brushes to the position best for commutation, and space limitations force designers to bring "live" parts closer together than is ideal from the insulation standpoint.

The carbon brush was introduced so early in the history of the commercial railway motor as now to seem a matter of course, but its adoption in place of the earlier copper brush contributed tremendously to success in electrifying horse railways. It provided a simple and cheap means for choking down the currents in the armature coils during the period of reversal. In stationary motors this could be done by shifting the brushes backward from the neutral axis, i.e., against the direction of rotation, but not so in car motors. With surface-wound armatures, and consequent long air gaps between pole faces and armature cores, the

carbon brush could have controlled the sparking evil alone. The field ampere-turns were large compared with those of the armature, and air-gap flux distortion was not serious. But when slotted armature cores, with short air gaps, came in, the case was different. It then became necessary to saturate the teeth heavily to prevent the production of a strong magnetic field along the brush axis, in a position to be cut by the short-circuited coils and in a direction to resist commutation. More recently the commutating pole has been introduced to supplement the effect of saturation and to reduce the necessity for it by providing a reversing flux in a definite location varying with the armature current. In this way it has greatly extended the range of non-sparking and non-flashing operation.

The above is in merest outline the history of commutation in the railway motor. Along with these large developments have gone others only slightly less important. The slotting of commutators, the expert manufacture of carbon brushes and the determination of the proper relation of armature and field turns, of the allowable voltage per commutator bar, etc., have all contributed to relieve the operating man's mind of what was once a bugbear to him. All of the items mentioned have contributed to pave the way for the higher-voltage motor.

LABOR DISPUTES AND ARBITRATION BOARDS

In discussions relating to the wages to be paid to railroad trainmen we think that the public often misses one very important point which distinguishes controversies of this character and those of the same kind between private employers and their employees. The private employer figures upon a certain amount of profit between the price at which he can sell his goods and the cost of producing them, and if the latter is increased because of the necessity of paying higher wages, there are three things which he can do. He can raise the price of his goods to cover the additional cost of production, or he can stop manufacturing entirely and sell his factory at comparatively small loss to someone to conduct some other industry there, or he can sell his factory and move to another place where the wages which he has to pay are lower. The railway, in common with most other public utilities, does not have this choice. It cannot stop operation even if it is not making enough money to pay operating expenses and the interest on its investment, and usually it cannot increase its fares. The business of electric railway transportation in most cities is conducted on a very narrow margin of profit, whose continuance depends on the maintenance of existing conditions. On this basis it has assumed certain burdens, such as pavement charges, street sprinkling, street cleaning, etc., and, in Chicago, enforced extensions with no earning capacity to justify them and the expense of rebuilding the track whenever water pipes, sewers or other underground city utilities are built across them or along them. With any radical change in the basic conditions of operation the close balance between income and outgo to yield a profit no longer obtains, and if expenses for labor are increased the extra-operating expenses just mentioned should be decreased. No railway manager begrudges an increase of pay to his men where the evidence shows that such an increase is warranted according to the wages paid elsewhere for similar work under similar conditions. But they recognize the economic fact that unless in some way a sufficient margin is maintained between gross receipts on the one hand and operating expenses and fixed charges on the other, present stockholders suffer an injustice and no additional capital for needed extensions and improvements can be secured.

The Chicago arbitration case teaches several important lessons. One of these, and perhaps the main one, is the supreme importance of the choice of the third or impartial arbitrator. In an arbitration case there is legally no obligation on the part of the arbitrators to be governed by the evidence, and in many cases they do not even discuss the evidence in their verdict but simply give their conclusions. We are not prepared to say that this is necessarily wrong, but we mention it to show the difference between a case decided by arbitration and a case decided by law. Cases at law may be decided erroneously as often as cases before a court of arbitration, but the judge in the former case feels obliged to justify his view of the case by an extended statement in which he attempts to prove that his verdict is justified by the evidence presented. Again, while an arbitration board consists nominally of three persons, it really consists of one judge and two counsel, one for each side. This leaves the "third" arbitrator in a position where he is unable to consult with any impartial persons upon the decision. Where the interests involved are large, this is a position of great responsibility, often too great for one man to fill properly, especially when he is in public life and has political ambitions. The whole tendency in modern government where decisions have to be reached from which there is no appeal is to provide more than one arbiter. This is the case with public service commissions, where there are always three and usually five members. It is also the case with the higher courts and the federal commissions. One remedy suggested is an increase in the number of "impartial arbitrators" from one to two or three. Such action would be a step in the right direction. Several men, under such circumstances, would not only be of assistance to each other in arriving at a proper decision, but would be of help in justifying the decision after it was announced. For the same reason, a further improvement, in our opinion, would be a change from one to two in the number of representatives from each side. A single representative has necessarily to be largely a partisan. To be otherwise would seem to be neglectful of the interests of those who had selected him. But with two arbitrators representing a side one would give moral support to the other in reaching a decision based on the merits of the case, even if it did not give all that was sought by those whom he represented.

Long Island Railroad Adopts Light, Steel Trailers

These Cars are Intended for Summer Use Exclusively—Unusual Features of Construction Are Provided for Combining Strength with Lightness

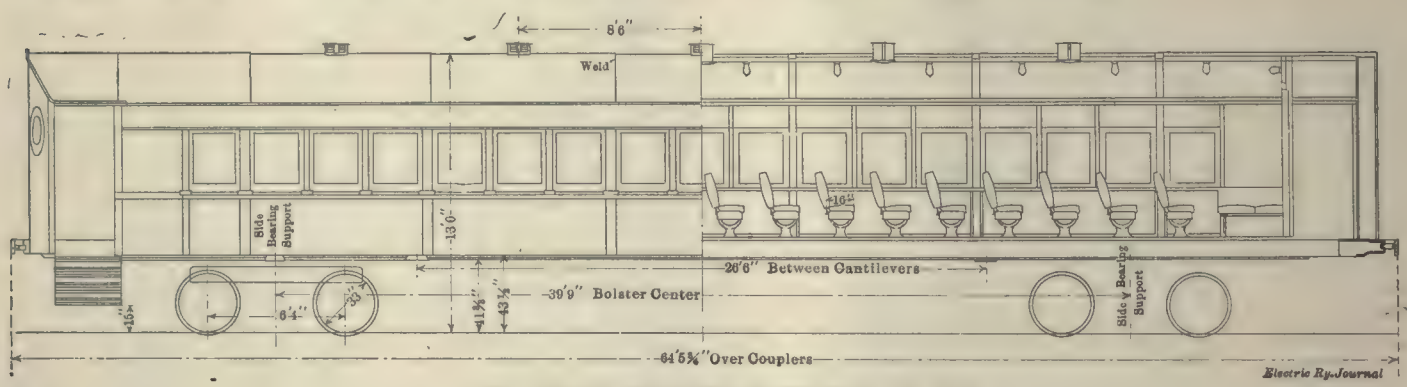
The Long Island Railroad, in order to provide for its heavy suburban passenger traffic during the summer, has ordered from the Standard Steel Car Company twenty new all-steel trailers, the design of which reveals a marked reduction in weight, while preserving a neat appearance and securing unusual strength at the points desired. The new cars were delivered recently, in time for operation during the heavy summer season. They are based in general on the dimensions and specifications of the "MP-54" car, the standard steel, 64-ft. 5¼-in. (over couplers) motor car now in suburban electric service on the railroad, and are now being operated in trains with these cars.

The general dimensions are as follows:

Length over body corner posts	54 ft. 9¾ in.
Length over couplers	64 ft. 5¾ in.
Distance between truck centers	39 ft. 9 in.
Wheelbase	6 ft. 4 in.
Height, rail to top of roof	13 ft.
Width over side sheets	9 ft. 8¾ in.
Width over belt rail	9 ft. 10¾ in.

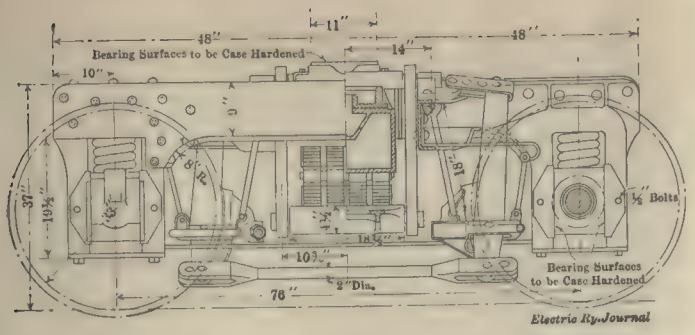
The cars, complete, including trucks, brake rigging and interior equipment, are estimated to weigh only about 68,000 lb., as compared with 87,000 lb., the approximate weight of the motor car without electrical equipment. The trailer car bodies, fully equipped, weigh about 49,000 lb., as against the motor car body weight of about 54,000 lb., not including electrical equipment.

As the trailers are exclusively for summer service, neither heaters nor headlining are installed. The car body is further lightened by the use of a rather flat-arched roof. The 3/32-in. roof sheets are riveted and welded together in such a manner as to eliminate leakage. The roof is supported directly by combined posts and carlines spaced on 8-ft. 6-in. centers. Opposite carline sections are welded together at the center of the roof, thus forming one continuous inverted U-shaped member. In order to support the low arch without an excessive number of carlines the roof is reinforced in an unusual way by means of two parallel lines of steel purlins, consisting of sections but continuous in effect, running longitudinally from end to end of the car. Each purlin is located 22 in. from the center line of the roof. The purlin sections at carline intersections meet and terminate in flanges shaped around under and riveted to the carline. The purlins transmit extraordinary longitudinal stresses to the roof and sides of the car, a strong vestibule and body end construction being provided.



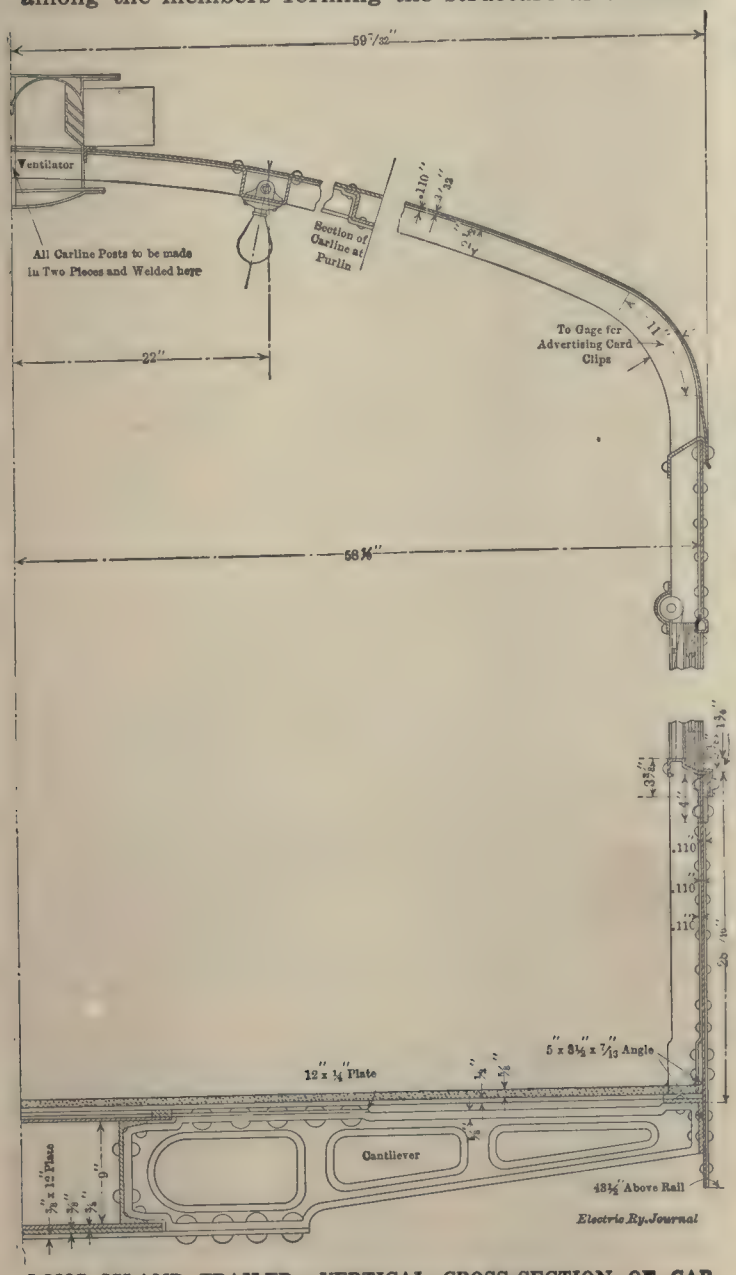
LONG ISLAND TRAILER—ELEVATION OF CAR

LONG ISLAND TRAILER—SIDE VIEW

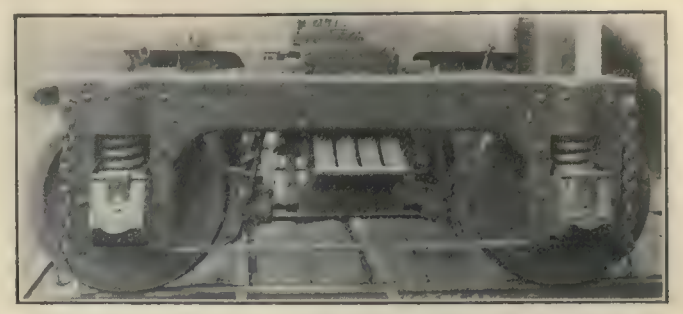


LONG ISLAND TRAILER—SIDE ELEVATION AND SECTION OF TRUCK

The purlins receive extra support at each body end by means of two vertical pressed-steel posts 4 in. wide, flanking each side of the 36-in. wide bulkhead door opening. The posts are riveted to the end sills and are tied together by a steel section running across the top of the door opening. The vestibule end posts, shown in the accompanying vestibule plan, are unusually strong and consist of two 12-in. I-beams weighing 31.5 lb. per foot. The purpose of this combination carline, purlin, vertical post and I-beam framing is to distribute the shock of a head-on collision among the members forming the structure as a whole.



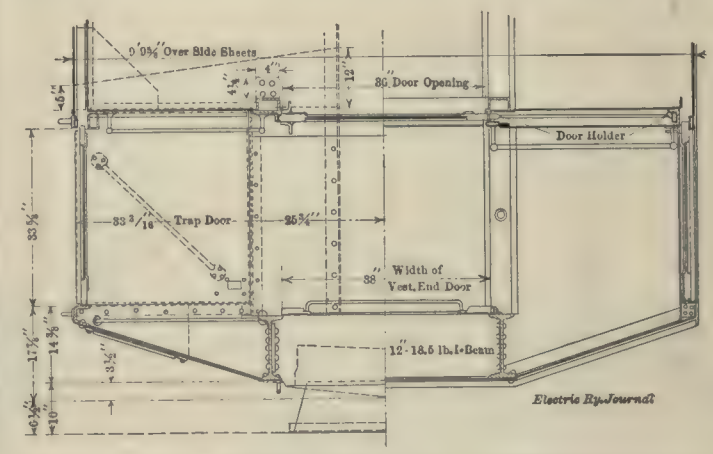
LONG ISLAND TRAILER—VERTICAL CROSS-SECTION OF CAR



LONG ISLAND TRAILER—SIDE VIEW OF TRUCK

The underframe crossings consist of a number of 5-in. channels and two cantilevers, spaced 26 ft. 6 in. apart, each 14 ft. 1⅞ in. from the outside of body posts. These cantilevers, together with the body end sills, take the place of the usual body bolsters. No body bolsters are installed, the center plates being attached to the center sills, which extend across the space between the cantilever and the body end sill in the form of a heavy box girder. The extension of this box girder supports the platform. The end corners of the underframe have been specially reinforced by horizontal pressed steel sections in order to protect the body corner from injury by side swiping.

The same principle of combining lightness with strength has been followed in the truck design. The weight of the new truck, including brake rigging nor-



LONG ISLAND TRAILER—FLOOR AND UNDERFRAMING PLAN OF VESTIBULE

LONG ISLAND TRAILER—INTERIOR VIEW

mally carried on it, is estimated at 9300 lb., as compared with 13,800 lb., the weight of the trailer truck of the "MP-54" motor car. The new truck, a side view of which is shown, is designed especially to withstand transverse stresses, being provided with a cast-steel bolster. The side gusset fastening to the transom is of extra width to stiffen the connection between pedestal and transom. No end rail is used. The chafing plates are case-hardened and have large bearing areas in order to overcome tilting of the bolster. They are bolted, not riveted, to the transom and bolster, respectively, and therefore are easily replaceable. The spring hangers are supported by chilled cast-iron blocks in order to prolong the life of the support. The trucks have 4¼-in. x 8-in. M.C.B. journals and Midvale Steel Company's 33-in. rolled-steel wheels with 2½-in. rims.

Miscellaneous Equipment

Ventilation of the cars is provided by "Automatic" ventilators of a new design but embodying the well-known "intake and exhaust" principle of this system. This device, known as Type E-B, is installed at five points, spaced 8 ft. 6 in. apart, on the center line of the almost flat roof. It consists of an exterior hood, divided into four separate compartments, two exterior deflectors, and an interior disk.

The flooring inside the cars consists of monolith laid in Keystone metal flooring. Thirty-six double "walk-over" seats and eight single end seats provide seating capacity for eighty passengers. All seats are rattan covered and have statuary bronze trimmings.

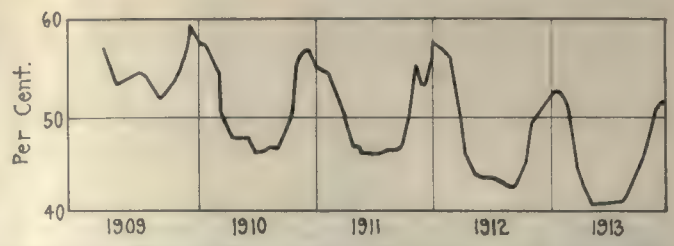
Sliding vestibule side and body-end doors are provided. The vestibule side doors are operated by the Gibbs door-operating device. Diamond pressed plate, ⅛ in. thick, is provided for platform floors, trapdoors and steps. Electric lighting consists of thirty 36-watt 130-volt lamps arranged in six circuits.

Other equipment specified includes Westinghouse air brakes, schedule A.T.L., including triple valves, 12-in. x 12-in. cylinder with slack adjuster, auxiliary and supplementary reservoir, Westinghouse friction draft gear, Westinghouse automatic hose couplers, Sharon special coupler, Union Spring & Manufacturing Company's springs, Lindstrom hand-brake handles, National Lock Washer Company's window and curtain fixtures and Pantasote curtain material.

Railway Power Rates in Chicago

Unit Cost for Energy Under the Terms of the 1913 Contract Has Increased Due to Decreasing Load Factor

The sixth annual report of the Board of Supervising Engineers, Chicago Traction, recently issued, contains an analysis of power costs over a period of four and one-half years under the contract described in the issue of the ELECTRIC RAILWAY JOURNAL for Dec. 6, 1913, page 1180. Early in 1913 this new contract was executed between the Commonwealth Edison Company and the surface railways. It possessed a number of advantages over the previous contract and was made retroactive, dating back to 1909. The report outlines the important points of the 1913 contract and presents records to show the savings resulting. The contract provided for a sliding scale in primary charge decreasing with a maximum demand from $1.25 per kilowatt per month for the first 30,000 kw., in 30,000-kw. steps, to 83½ cents per kilowatt. It also provided for a sliding scale of secondary charge decreasing with increasing output from 0.4 cent to 0.36 cent per kilowatt-hour. Under the old contract there was a flat primary rate of $1.25 per kilowatt of maximum demand and 0.4 cent per kilowatt-hour secondary charge.

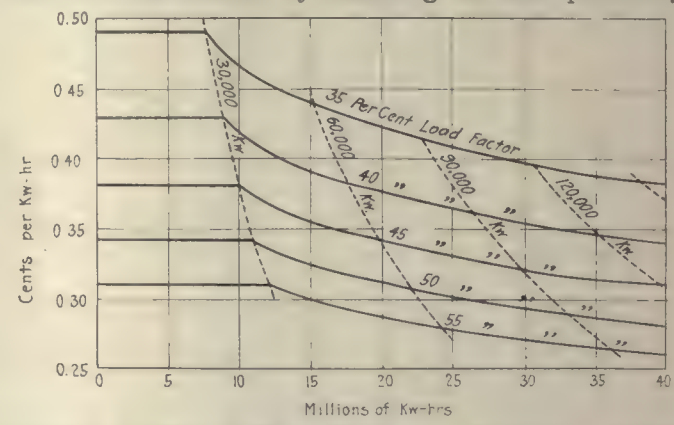


CHICAGO POWER RATES—GRAPH OF LOAD-FACTOR VARIATION BY MONTHS

Under the old contract the primary charge would have increased between 1910 and 1913 from 0.337 cent to 0.383 cent per kilowatt-hour, whereas under the new contract it has increased from 0.325 cent to 0.348 cent per kilowatt-hour. During the same period the secondary cost has averaged about 0.395 cent, the limits being 0.397 cent and 0.392 cent per kilowatt-hour. The total cost has increased in spite of the larger amount of energy used, as follows: 1910, 0.737 cent; 1911, 0.741 cent; 1912, 0.760 cent, and 1913, 0.783 cent.

The increase in total cost is due to the larger primary charge, due in turn to the decreased load factor. The change in load factor is shown in an accompanying diagram, and it is explained in the report by reference to the rush-hour conditions which have become more acute each year. The addition of cars during the rush-hour period increases the peak load during that period and correspondingly decreases the load factor. The maximum demand has therefore grown at a greater rate than the total energy consumed.

The second chart reproduced herewith from the report gives in graphical form the basis of the calculation of primary charge per kilowatt-hour for different monthly energy consumptions and different load factors. These curves can be reproduced from the terms of the contract by assuming for each point any



CHICAGO POWER RATES—CURVES OF PRIMARY CHARGE WITH DIFFERENT LOAD FACTORS

maximum demand and load factor. Multiplying these two gives the average load, and multiplying this by 730, the average number of hours in a month, gives the monthly kilowatt-hour consumption. The primary charge per month for the assumed maximum demand is given by the terms of the contract, and this divided by the monthly energy consumption gives the primary unit cost. The chart shows clearly the effect of load factor on this unit cost and, taken together with the load-factor diagram, furnishes an explanation of the increasing total unit cost for energy.

As would be expected, there is a decided seasonal variation in the cost of power, the maximum, which is reached in summer, being higher by 0.15 cent per kilowatt-hour than the minimum, which occurs in the winter months. Graphs reproduced in the report show these seasonal variations.

Pittsburgh Railways Claim Department

A Co-operatively Functional Type of Organization, with the Five Separate Bureaus, Has Been Built Up—Details of the Various Systems Used Are Published

The claim department of the Pittsburgh (Pa.) Railways, under the supervision of Cecil G. Rice, superintendent, is an excellent example of the application of modern business principles to the work of settling claims. To be more specific, it deserves description on account of its functional type of organization and its recognition of the value of fixed principles, definite policies and psychological essentials in every-day claim work. This article will be confined to a description of the organization itself, and the psychological and other features will be discussed in a later issue.

Types of Management

When Mr. Rice took up the reorganization of the Pittsburgh Railways' claim department more than five years ago, he resolved not to base the practices of his department upon mere imitation of those in the claim departments of other companies or gradually to work out a system for Pittsburgh by means of the "trial and error" process. Instead, it was decided that of the three types of management, "autocratic," "autocratic-divisional" and "co-operatively functional," the last and most modern was best suited to solve the existing problems. According to this decision, active work was immediately begun along the five factors of such management, as follows:

1. Investigation and standardization.
2. Planning of organization to carry the chosen standards into effect.
3. Selection of staff for organization.
4. Provision for compensation, discipline and development.
5. Provision for understudies and recruits.

Principles of Standardization

After investigation of the conditions the management evolved six distinct fixed principles of standardization, or standards, in accordance with which every claim employee in so far as possible must bring his thoughts and actions.

These fixed principles are as follows:

1. *Maximum Accuracy*—Incontrovertible facts unearthed from all available sources.
2. *Utmost Expediency*—The promptest action in accord with propriety and correctness.
3. *Absolute Fairness*—A fixed, irrevocable policy of dealing with justice to all concerned.
4. *Persistent Courtesy*—Constant politeness combined with kindliness.
5. *Minimum Consistent Expenditures* — Disbursements proportionate to all the facts.
6. *Perfected Co-operation and Efficiency*—Working in harmony to produce the most satisfactory results with the least expenditure of time and effort.

Plan of Organization

To carry out the above-enumerated standards, the claim department was divided into five separate bureaus to handle the different classes of work. These are called the clerical bureau, the inspection bureau, the adjustment bureau, the litigation bureau and the medical bureau. They act automatically and co-operatively in handling accidents and settlements. Each one is also capable of acting separately as a unit department of the Pittsburgh Railways. All the bureaus are supervised by the superintendent of the claim department, who reports directly to the president of the company. It is the desire of the management that each bureau be ultimately known far and wide by its distinctive bureau title and not as a so-called branch of that generally misunderstood and therefore mistrusted "claim department." Only occasionally is the "claim department" referred to in dealing with the public, the bureau concerned alone being mentioned.

Each bureau at its very beginning was placed under a chief reporting directly to the superintendent. Each chief is regarded as and in reality is an assistant superintendent and is of equal rank with the other chiefs. The superintendent each month appoints one chief as the senior chief to act in his absence. Yet the equality of all the bureau chiefs is shown here, too, for they all rotate in appointment as the senior chief.

Selection of Staff

Of allied importance with the co-operatively functional organization of the department is, of course, the personnel selected to carry on the work. One of the most difficult problems for claim departments to solve effectively is the public feeling that claim agents and their employees are all "thugs," "roughnecks" and tricksters. The first act in selecting employees for the new organization in Pittsburgh was the employment of several college men of pleasing personality for the purpose of influencing the opinion of the public. All the new members of the department came in without previous experience in claim work, but they were rapidly developed along the proper lines and from the beginning helped to inspire in the public a better confidence in the gentlemanliness and integrity of claim employees. The present number of employees is fifty-five, of which eleven are college-trained men. Others were selected from among the platform men or because of some special fitness. Everything else being equal, college men are preferred, but they are always selected in competition with other applicants and not solely on account of their qualification of college training.

Provision for Compensation

The claim department of the Pittsburgh Railways recognizes the relation that exists between efficient results and the payment of a reasonable compensation for work actually done, both currently and in the future. Accordingly, it does not pay for a certain "job" or a certain "desk" but rather for individual ability and personality. To do this it uses a unit system of efficiency that enables it to make a systematic record of the work performed by each employee and to govern his salary thereby. Each employee makes out a daily report covering the work done, and this is checked by the chief of the bureau. The blank used for such reports, shown in Form 1, has ruled sections for the reporting of all cases returned for credit, the noting in full of all "defects" observed in construction or operation and the making of explanations, remarks and suggestions in connection with anything affecting claim or other departmental work. These individual reports are summarized by the auditor on the monthly comparative efficiency report illustrated by Form 2. At the top of this sheet, which is 19½ in. x 26¼ in., there are separate sections for the inspection bureau, the adjust-

PITTSBURGH RAILWAYS COMPANY
CLAIM DEPARTMENT

Use Reverse Side of Sheet For:
Listing of Cases Returned for Credit
Reporting in full on Defects Noted
Explanations, Remarks and Suggestions on Work

	STATEMENTS TAKEN				SETTLEMENTS MADE	
	A Claim	NO CLAIM B Inj	C Prop	D Wit	E Amount Cash	F Amount Voucher
Case No. / Time / Principal / Witness / M Taken at						
Case No. / Principal						
Time / Witness / M Taken at						

G SPECIAL INQUIRIES MADE	RESULT OF INQUIRY
Case No. / Time / Principal / Witness / M Made at	
Case No. / Time / Principal	
Time / Witness / M Made at	

Approved ..... Chief of Bureau | The correctness of this report is certified to by ..... Investigator or Adjuster | Total units ..... No cases on hand | Date work performed ..... 191...

PITTSBURGH RAILWAYS CLAIM DEPARTMENT—FORM 1—BLANK USED BY INDIVIDUAL CLAIM EMPLOYEES FOR MAKING DAILY REPORT

ment bureau and the litigation bureau, with separate lines for the individual employees. The illustration shows merely the bottom of the sheet, beginning with the summary for these bureaus, the column rulings and headings being the same as used above.

Different units are granted for different classes of work; for example, two for every release, two for every signed statement, one for every special inquiry and one extra unit for any work after 7 o'clock in the evening. By actual trial it has been found that to be 100 per cent efficient a man should have to his credit 300 units per month, or 3600 units per year. Any number of units less than these amounts would indicate that the employee was only proportionately efficient. Frequently the average of several men is higher than 300 units. Of course, when the number of units of work performed by any man falls below the standard, the management is most careful to ascertain the cause for such inefficiency. Sometimes, for instance, it might be found that the work presented to an entire bureau for a certain period was slack.

If ten outside inspectors are paid on an average of $90 per month, the work done by these men costs $900 per month. When $900 is divided by the total number of units of work credited to these men, the quotient in reality gives the cost of each unit of work, but the management reverses the point of view and considers this to be the amount of money earned by the employees for a unit of work. Each person's total units are multiplied by the average cost per unit, the result equaling what he has earned for the month. This may be more or less than his payroll rate. The salaries do not fluctuate monthly in accordance with these figures, but if a man can earn on this basis more than he is being paid and continues to do so for a period of four months or more, his salary is automatically increased on the basis of his record. If a man runs lower than the standard for four months, or even for a shorter time if the deficiency is great, the management takes steps to find out the reason. Inquiries are made from the chief of the bureau, or, if no explanation is forthcoming here, from the man himself, the management in all its interviews working with the intention of keeping its efficient employees permanently in the organization if possible.

In general, this unit system has resulted only in increased efficiency. For example, during the year following its installation the efficiency of the outside men was increased 20 per cent. Experience has shown, too, that the cost of supervision is less on the high-unit men. Maximum supervision is provided with a minimum number of outside men. The salaries have, of course, increased. During the five years when the unit plan has been in operation, the salaries in the claim department have increased $1,500 per month for the fifty-five employees now there. At the present time, however, with more work, the department has six less men than a year ago, and the total payroll is less. No employee ever thinks of asking for an increase in salary, for he knows that he will get it if he can prove by the sustained character of his work that he merits it.

PITTSBURGH RAILWAYS COMPANY—CLAIM DEPARTMENT

COMPARATIVE EFFICIENCY REPORT SHOWING WORK OF ALL BUREAUS during Month of ..... 191 ..

INVESTIGATION BUREAU	STATEMENTS: PRINCIPAL Claim A	NO CLAIM Injury B	Property C	Witness D	Total Statements	SETTLEMENTS: Cash E	Voucher F	Total Settlements	Extra Units	SPECIAL INQUIRIES No. G	Units	TOTALS Cost @ Per Unit	Atty's Hands	Defects Reported H	Cases on Hand	PERCENTAGE OF EFFICIENCY Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average Percentage Efficiency the Current Year	Average Standing for ..... Month Current Year	Leaves	DAYS ABSENT Sick	Accident	Leave	Court	Totals
Investigation Bureau Totals																																			
Adjustment Bureau Totals																																			
Litigated Claims Bureau Totals																																			
GRAND TOTALS																																			

OFFICE STATEMENTS

STATEMENT INVESTIGATORS	Claim	No Claim	Witness	Total	Total Units	Per Cent. of Efficiency
1						
2						
3						
4						
5						
6						
Totals						

INQUIRY BLANKS

NAME	Number Mailed	Average Number Per Case	Per Cent. Replies	Percentage Not Delivered	Total Units	Per Cent. of Efficiency
1						
2						
3						
Totals						

SPECIAL ESTIMATES
Automobile .....
Wagon .....
Property .....
Total .....

VETERINARY EXAMINATIONS
Dr. .....
Dr. .....
Dr. .....
Total .....

MEDICAL BUREAU
Special Physical Examination
Dr. .....
Total .....

MISCELLANEOUS

	Current Year To Date	Same Period Last Year
H-H BUREAU: Names Reported		
H-H BUREAU: Replies Received		
D. P. J. Reports Received		
Cross-Indices Made		
Car Tickets Issued		
Witness Meal Tickets Issued		
Information File Inquiries Received		
Court Cases Copied		
Cases to be Copied		

AVERAGE COST PER UNIT FOR DEPARTMENT

Average for Current Month	Same Month Last Year	Average This Year to Date	Average Same Period Last Year

Remarks: .....
Date: .....
Auditor .....

PITTSBURGH RAILWAYS CLAIM DEPARTMENT—FORM 2—MONTHLY COMPARATIVE EFFICIENCY REPORT SUMMARIZING WORK OF INDIVIDUALS AND BUREAUS

In the foregoing manner the management keeps the employees of the claim department in a satisfied frame of mind as regards their salaries. Occasionally, however, there is found a man who does not find himself suited to claim work. Although the management offers every inducement to permanent employment, yet if any competent employee really desires to change to another line of work, the superintendent is at all times ready to use his best influence to place the employee in another position. Just how tangible this aid is can be judged from this—out of forty-seven previous employees, twenty-two now have good positions secured chiefly through Mr. Rice's influence and efforts. Five men are chief adjusters for casualty companies, and the others hold such varied positions as parole officer and assistant parole officer of Allegheny County, parole officer of western Pennsylvania, chief clerk in the county tax collector's office, superintendent of schools in a New Mexico city, investigator for the Carnegie Hero Fund, practicing attorneys, doctors, secretary to a bank president, city editor of a Pittsburgh newspaper, etc. The attitude that Mr. Rice takes toward these men is exactly that which a university feels toward its graduates. At a meeting of the claim department in December, 1914, held as a testimonial to Mr. Rice, these outside men were present as the "alumni" of the department. They all are still loyal to the department and in every action testify to the spirit of good fellowship that exists between the management of the claim department and the employees, past or present.

Provision for Co-operation and Development

The basis of the co-operative work of the department is a meeting between the superintendent and the members of his staff, held every Saturday at 2 p. m. Besides the bureau chiefs, there are present the auditor and the principal adjuster, whose duties are later explained. At each meeting the work of the last week and the immediate future is discussed, and each staff member is held responsible for knowing as much about the business as the superintendent. The rotating appointment as senior chief and the possible necessity of acting in Mr. Rice's absence makes this responsibility an important one. Those meetings are reported, and copies of the minutes furnished to each member. Later these minutes are bound and preserved in the department library.

To bring about closer co-operation among the employees of each bureau and between them and the management, a meeting of one of the bureaus is held once a month. At this the policies and the acts of the bureau are discussed and all questions put forth by the employees answered. When these meetings are about half over, Mr. Rice usually joins the group for a short talk to the men. The last Friday of each month is devoted to a general meeting of all the employees of all the bureaus, and this meeting is sometimes addressed by attorneys, doctors, executive officers of the company and other prominent persons. Once a year a meeting is set aside for the consideration of suggestions turned in by the department members. Another meeting, a sort of informal reception, is attended by relatives of employees. All meetings are fully reported in typewritten form.

The general meeting of December, 1914, was in charge of the members of the staff and the program was arranged by them. Each bureau chief read a paper in the nature of a review of the changes made in his branch of the work under the present superintendent. In addition, each member of the different bureaus addressed a letter to Mr. Rice, commenting upon the advancement made as an individual and as a unit of the department. These papers and letters were bound in limp leather and presented to the superintendent. At a meeting held in 1913 an embossed resolution signed by each member of the department was presented to Mr. Rice. This meeting was addressed by the then vice-president and general manager, S. L. Tone.

The work of developing the men is carried on not only through the talks given by the superintendent, the chiefs and the outside experts, but also by the papers which the men read at the meetings. Most papers are read at the general monthly meeting, but some are read in the bureau meetings on subjects relating to particular practices and policies of each bureau or even to more general topics, such as the experiences of delegates attending the American Electric Railway Association conventions, visits to other claim departments, etc. All papers are made out in duplicate, and copies are bound each year and added to the library. Besides the presented papers, the department also has in its library various inspirational books, works on practical psychology, efficiency, scientific management and claim work, as well as many periodicals and all paper books of attorneys. Furthermore, it reprints certified copies of Pennsylvania Supreme Court and Superior Court decisions for distribution to the men, in order that they may at all times be conversant with the final legal decisions in matters relating to claims and allied subjects.

Provision for Promotion, Understudies and Recruits

New men entering the claim department are usually started in clerical bureau work, inasmuch as this requires the least experience and can be most readily learned. The next step is to the inspection bureau, then to the litigation bureau and finally to the adjustment bureau. The medical bureau members, of course, are doctors. In general, the chief of each bureau gives his personal attention to each man under him. If a high-priced man leaves the department, an effort is made to move the men up all along the line. If his work, however, can be transferred to the other members, the pay of the man who left, or a portion of it, is distributed among those who thus increase their efforts.

The plan of organization of the department provides for understudies in all its branches, or men trained to handle the work of their immediate superiors. They are tested during the vacation period. This not only protects the work of the department during absences but also marks out a definite program of advancement for the men if they keep up to and above the standard and if they are fitted for the advanced work. The time for progress from one bureau to another varies with conditions and with men. Some have made the rounds in less than a year, while others may never reach the highest position.

Besides the understudies the department has recruits, or men on the waiting list for employment. Applications for employment in the claim department come from widely-scattered sections of the United States, such as New York, Illinois, Washington, etc. These are all systematically listed for future reference as the way is opened up for new men.

Superintendent's Office

The supervision of the entire claim department is in the hands of the superintendent. He receives a copy of every typewritten letter, memorandum and report received or sent out, and he signs all letters, although

they are dictated by the bureau chiefs. The superintendent has in his own offices a stenographer, who is the only one not under the supervision of the chief of the clerical bureau. Directly under the superintendent's control there is also the auditor, who handles all the accounting records for the claim department and in turn supervises the work of the cashier and the release clerk.

The cashier keeps a card index for all disbursements and all sums paid in the settlement of claims. Cards are kept under the name of the individuals when money is paid to them directly, or under the names of the individuals and their attorneys when payments are made to the latter. The release clerk keeps a record of all cases released and sends word of this final settlement to the proper persons for filing and for preventing any possible duplication or needless assignments. A release taken by an outside adjuster is approved by the chief of the adjustment bureau and checked by the release clerk, the cashier and the auditor before being finally approved by the superintendent.

The two most important records used by the cashier are shown in Form 3 and Form 4. Form 3 is the receipt that is filled out by an adjuster when he receives money needed for the settlement of current claims. He stands charged with the amount turned over to him and must account for it all in cash, properly executed releases, receipts or other proof of authorized expenditures. An adjuster is not allowed to have more than one receipt outstanding against him at any time. The bottom half of the form is retained by the adjuster and is filled in by him before he turns back his remaining money to the cashier. The back of the top half contains similarly-ruled divisions in order that the cashier may place on her record a list of the releases secured and the balance returned. A general requisition is issued by the claim department upon the auditor of disbursements of the company in order to be

PITTSRURGH RAILWAYS COMPANY
CLAIM DEPARTMENT

No 16348 Pittsburgh, Pa.

RECEIVED from the Superintendent Claim Department, Pittsburgh Railways Company, the sum of

Dollars, to be returned on demand either in cash or properly executed and approved Releases, Receipts or other proof of authorized expenditures.

Case

Authorized by Adjuster

I HEREBY CERTIFY that all previous receipts authorized for above Adjuster have been cancelled.

Cashier

To be Retained by Cashier

No. 16348 Pittsburgh, Pa.

The sum of $, receipted for on upper half of this form, is hereby accounted for as follows.

Date Release of $

Date Release of $

Date Release of $

Date Release of $

Date Release of $

Date Release of $

Received payment as above noted: Total Credit $ Cash Returned $

Cashier Adjuster

To be Retained by Adjuster

No. Pittsburgh, Pa.

The sum of $, receipted for on other side of this form, is hereby accounted for as follows:

Date Release of $

Date Release of $

Date Release of $

Date Release of $

Date Release of $

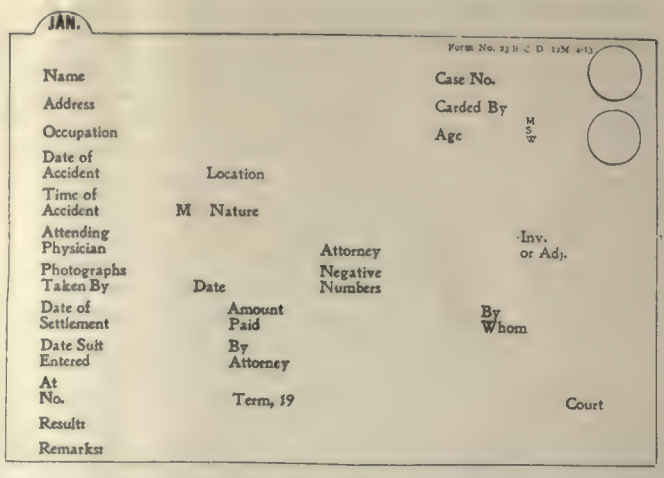
Date Release of $

Received payment as above noted: Total Credit $ Cash Returned $

Cashier Adjuster

To be Retained by Cashier

PITTSBURGH RAILWAYS CLAIM DEPARTMENT—FORM 3—ADJUSTER'S BLANK FOR RECEIPTING MONEY AND ACCOUNTING FOR DISBURSEMENTS


JAN.

Name Case No.

Address Carded By

Occupation Age M S W

Date of Accident Location

Time of Accident M Nature

Attending Physician Attorney Inv. or Adj.

Photographs Taken By Date Negative Numbers

Date of Settlement Amount Paid By Whom

Date Suit Entered By Attorney

At No. Term, 19 Court

Result:

Remarks:

PITTSBURGH RAILWAYS CLAIM DEPARTMENT—FORM 4—CARD USED IN GENERAL INDEX FILE OF CLERICAL BUREAU

reimbursed for amounts expended for the releases listed in the requisition.

One of the most novel creations of the present management is the "satisfaction book." This book contains a record of all cases which have been decided in court for less than the claimant had originally been offered by the company in settlement, or in which verdicts were returned in favor of the defendant. The cases are indexed according to the character of the accident, the street and geographical location of the claimant and the attorney involved. The adjusters have access to this book and each chief has a copy. It is very useful in showing claimants that certain attorneys "who have won every case" have lost particular cases perhaps like the one in question, in furnishing claimants with names of neighbors who can testify as to the foolishness of taking cases to court, and in offering concrete proof that the company has itself in so many cases in its first offer exceeded what the courts later held to constitute a fair settlement.

The superintendent maintains in his own office an index of all the attorneys in the three counties served by the company and also files the reports from the several bureaus and all statistical reports. Aside from the regular periodic statistical reports showing the work of the department, there might be mentioned as one example of special statistical investigation the time study that was conducted to ascertain the most agreeable hours of calling for various classes of men who come to the company offices to discuss claim subjects. It was found that the time generally preferred by claimants was from 10 a. m. to 4 p. m., while attorneys could most conveniently call from 8 a. m. to 10 a. m. and from 3:30 p. m. to 5 p. m., and employees were able to report at any time. This investigation made it possible to arrange the calling hours so as to cause the least conflict between the first two classes, the employees being used mostly to fill up any light periods.

The superintendent also keeps a file giving the complete records of all the men employed in the claim department. Moreover, he has a pocket list showing the names of the men, their telephone numbers, the time required for each man to reach the office after notification and also the time required to reach the nearest carhouse. Each member of the staff has a copy of this list.

Now and then, under the superintendent's direction, a check is made with comptometer cards to see how much time is being spent upon some particular operation in the bureaus, such as indexing different papers, dictation, transcribing and similar acts. This

is done in order to keep efficiency up to the proper standard and to divide the time rightly between different operations. Each of the seventy forms in use is original, and, before a supply is reordered, is checked by the superintendent and the chiefs for improvements or changes. Furthermore, twice a year suggestions are solicited from every employee in the department as to changes in the methods of doing the work or the elimination of any feature. Suggestions, however, are welcome at any time. In these ways waste motion is avoided and errors are corrected. Accuracy and speed are the ends sought.

ADJUSTMENT BUREAU

The adjustment bureau of the Pittsburgh Railways contains the chief of the bureau, the principal adjuster and four outside adjusters. Under the original plan of organization the principal adjuster was not included, but as the work developed this office was created. All claimants calling at the department offices are received by the principal adjuster, who works in close harmony with the outside adjusters and the bureau chief. During 1914 he alone settled 2900 claims, an average of eight a day. The chief of the adjustment bureau has to do with cases that are settled on the outside and has charge of the four outside adjusters. The principal adjuster is really a master adjuster handling a particular class of cases, and he has no more authority than the chief of the adjustment bureau. Both of these men report directly to Mr. Rice, and neither would ordinarily pay more than $300 in settling a case without consulting him.

At 8 a. m. the adjusters report at the office, where they have a separate desk and the services of a typewriter operator, who takes their dictation directly on the machine. Every act in connection with any case is a matter of record. During most of the day the adjusters are outside and report by telephone four times. The process of adjusting cases is largely a matter of judgment on their part. No adjuster, however, would think of paying more than $100 without an authorization from the chief of the adjustment bureau. There are, in general, four steps in adjustment work, as follows: (1) The adjuster settles by using his own judgment; (2) the next morning, if the case is not settled, the adjuster turns it over to the chief of the adjustment bureau for decision; (3) if the chief does not desire to pass upon it, it is put up to the superintendent of the department, and (4) if the superintendent should be in doubt, the case is presented to the "board of claims review," composed of the president, the superintendent of the claims department, the general attorney and the general manager. The number of cases presented to this board is a matter to be determined by the superintendent of the claim department.

The chief of the adjustment bureau maintains a follow-up file of every current claim pending and is at all times in possession of all essential facts. During 1914 three-fifths of all settlements made were effected in the offices of the claim department, an increase of 50 per cent over 1912. This shows the growing tendency of the public to handle claims as "a matter of business" instead of "a matter of law," as well as the fact that the prejudice of the public against the department is being speedily overcome.

INSPECTION BUREAU

Besides the chief, the inspection bureau is composed of a statement inspector, who takes statements from all persons calling at the offices; a photographer; a night inspector, who is on duty from 6 p. m. to 6 a. m.; an estimator, a veterinary surgeon, safety inspectors with offices at selected carhouses, secret service operatives and six inspectors. It is the function of these men to secure all particulars regarding accidents. The estimator inspects damages to physical property, the veterinary examines injured animals and the photographer takes assignments in duplicate from the chief of the bureau. The safety inspectors at the various carhouses interview trainmen, typewrite statements and inspect equipment involved in accidents. The claim department is open twenty-four hours a day, and after business hours the night inspector sends out inquiry blanks, clips newspapers, receives all telephone reports of accidents and notifies the chief or the superintendent in the event of a severe accident.

LITIGATION BUREAU

When a claimant enters suit against the company, the department receives a notice from the general attorney. After being reviewed by the superintendent, the case then goes to the litigation bureau. If all witnesses have not been seen, however, it is referred to the inspection bureau for such action and is then returned to the litigation bureau for preparation for trial. Under any conditions the case goes finally to the litigation bureau when it is placed upon the court calendar.

Under the chief of the litigation bureau are the principal court investigator, the principal locator, the court investigators, four locators and the court clerk. The locators are used to see that witnesses are in court when needed. They act as investigators when court is not in session. The court clerk each evening secures from the clerk of the court a list of the cases to be called the next day and a list of suits entered that day. He also obtains a summary of all damage suits entered in the county against anyone and a summary of all verdicts rendered against any defendant, which are made a matter of record in the claim department.

The litigation bureau keeps a card file for every suit entered and also an index of legal opinions. Transcripts of testimony, records of appeal, etc., are filed in this bureau. It also maintains a record of all witnesses for and against the company in the cases that arise. The witnesses in new cases are then checked up by any existing testimony in other cases, so that "ringers" cannot be used.

MEDICAL BUREAU

The medical bureau proper of the company consists of a chief, an examiner and a stenographer-nurse. The men spend most of their time in the offices of the department. For any special injury the chief arranges to call in the best expert in that particular line. The company maintains an examination room where claimants are examined and sometimes emergency treatment is given. The bureau has a separate medical library, charts, skeleton, operating chair, instruments and complete surgical and examining equipment. The chief co-operates with the trial attorney in arranging the medical defense in litigated cases and with the chief of the adjustment bureau in current claims.

In the medical bureau there is a card file of all doctors with whom the company has had or may have dealings. This list is indexed by doctors and by subjects. The verbatim reports of court testimony are secured where doctors who make a practice of testifying against the company are called. The list at present contains the names of about 3000 doctors, showing their hospital and other connections and a summarized record of all the cases in which they have been interested either in making examinations or in giving treatment. The company

receives medical magazines from all parts of the world and clips these for important articles.

Clerical Bureau

Besides the chief of the bureau, there are several clerks performing various duties in this and other bureaus. All mail is opened and dispatched in the clerical bureau. Moreover, with the exception of the special files kept in the superintendent's office, the litigation bureau and the medical bureau, all other files are kept in the clerical bureau, so that the main duties of the clerks there have to do with the making and the filing of records.

The only two permanent files in the clerical bureau are the general index and the information file. The general card index is for every person involved in any kind of accident with the company or with any other company for which reports are available. Newspaper reports and reports from other companies and claim departments in regard to fraudulent claims are included. Form 4 shows the character of the index card used. The main divisions of the classification are according to the surnames and the subdivisions according to the first names of claimants. Under each division and subdivision the cards are separated according to a tab showing the month in which each accident occurred. The cards used for males are gray; for females, pink, and for property damages, yellow.

The other permanent file referred to above, the information file, is a record of any person, connected with any company, who is known, either favorably or otherwise, to any employee of the railway; a record of the residences of all attorneys, etc. This file is divided in the following manner: (*a*) an index according to streets—that is, cards for the blocks numbered from 100 to 200, from 200 to 300, etc.; (*b*) an index by companies; (*c*) an index by occupation, and local trade and other organizations, and (*d*) an index of all employees of the Pittsburgh Railway, the Duquesne Light Company, the Beaver Valley Traction Company and the Philadelphia Company. These are arranged geographically in order that an employee may be found who lives on the same street as any claimant. The first three indices are cross-referenced with the general index file to show any case with the company in which the individuals may have been involved.

Recording of Accidents in Clerical Bureau

In the clerical bureau there is also an accident register in the form of a loose-leaf book, run by days of the week. This book takes sheets 17 in. x 26⅜ in., ruled alike on both sides. From left to right columns are provided to show the consecutive numbers of the accidents, the time, the car and division numbers, the location, the nature of the occurrence, the principals and their addresses, the names and numbers of the motorman and the conductor, the classification number of the accident, and the original assignment to an adjuster or an investigator. A note is made at the bottom of the sheet in regard to the weather conditions existing on the day in question.

Accident reports are made out by car crews or the safety inspectors in triplicate and forwarded to the clerical bureau, where they receive classification numbers, are checked up with the general index and the information file and then go to the chief of the adjustment bureau. The latter reads them and assigns such as he thinks should go to adjusters. The others he sends to the chief of the inspection bureau, who assigns them as he sees fit. If any information along medical lines is needed, a memorandum is sent to the medical bureau.

Probably nine-tenths of the accidents reported by crews have previously been reported by telephone by inspectors, dispatchers, or local or division superintendents. If none of these officials is met and the line is not tied up by stopping, the accident is reported over the telephone by the motorman and the conductor themselves. For instance, if a woman at 9 o'clock in the morning had an accident and this was telephoned, five copies would be made, one for the superintendent and copies to the clerical, medical and inspection bureaus. The inspection bureau would in a short time be seeing witnesses and learning the essential facts, the medical bureau would ascertain by examination or inquiry the extent of the injury, an adjuster would be informed as to the name and address of the woman in order for him to secure her statement of the occurrence, and the clerical bureau would search the records and consolidate the information secured by the other bureaus with the crew's report. Final decision as to adjustment could then be made by the chief of the adjustment bureau.

Card "Kinks" in Clerical Bureau

Besides the general index file and the information file previously described, the clerical bureau of the

Case No.....
(Show Company Initials, letter and "copy")
Date.....191..... Exact Time.....M.
Principal.....
Charge.....Credit.....
Remarks:.....
.....
.....
File Clerk..... Reception Room Clerk..... This charge made by.....

INSTRUCTIONS:—This form is to be made out at the time any case is moved from one person, or from one desk, to another. Person from whose possession case is moved will be held responsible. The exact time of the movement must be shown. Initials of Company are to follow all but P. Rys. Co. case numbers, as well as subdivision or other letter. If case consists of white or yellow copy only, or if copy of Court case, same must be indicated. Cases taken from file vault must bear initials of File Clerk and cases handled in Reception Room must show initials of persons handling.

THIS CARD TO BE FORWARDED TO INDEX CLERK IMMEDIATELY

PITTSBURGH RAILWAYS CLAIM DEPARTMENT—FORM 5—CHERRY CARD USED TO KEEP TRACK OF CLAIM DEPARTMENT DOCUMENTS

Pittsburgh Railways has three original card "kinks" that have been developed by the management to aid in the general smoothness of the work. These are the "cherry" card, the "reminder" card and the "reception room" card.

The cherry card was devised by Mr. Rice in order to keep track of case files and documents. One of the most troublesome office problems in claim departments is to know at any time where the records of any case are located. By the use of the cherry card, shown in Form 5, this problem is easily solved. Every time a case is moved from one person or one desk to another, one of these cards must be filled out, the person from whose possession the case is moved being held responsible for the recording of the transfer. The card provides for case number, name of principal, date, exact time of movement, name to be charged with the case data and name to be credited, remarks and spaces for initials of charging person. A constant messenger service is kept up around the department to collect all the cherry cards. These are filed by case numbers in the central file, and the clerk in charge of this can at any minute of the day tell exactly where any document is located.

The reminder card is a unique scheme to call certain things to the attention of employees at the proper time without them being burdened with constant memory in the meantime. Any employee desiring to be

reminded of any engagement to call, appointment at the company's office, letters to be expected, papers to be returned, work to be completed by a certain time, cases to keep in touch with, etc., simply reports such facts to the proper stenographer or else himself fills out a reminder card, as illustrated in Form 6. This provides for three dates on which the employee will be reminded as requested. The cards are filed in the clerical bureau according to reminder dates, and each employee at the proper time has the stated matters brought to his attention.

The reception room card furnishes information for bringing callers into a more intimate relation with the claim department and putting them into a better frame of mind by telling them in a cordial and perfectly casual way that they are expected. Each employee who expects a visitor at the company's office fills out a reception room card (see Form 7), which goes to the clerk at the desk in the reception room. Each morning this clerk sorts out the cards for appointments on that day and carries the names in his mind. When one of the expected callers arrives, he is met with the statement: "Mr. ——— is expecting you. If you will just sit down for a moment, I'll take your name right in," and he is properly impressed thereby. The reception room clerk also keeps a daily list of all callers, showing the names, time of arrival and admission, men visited, references to other officers, time consumed in calls, case numbers or names concerned, and total number for day.

Case No.....

Date on which to be Reminded 1.....191..... 2.....191..... 3.....191.....

To CHIEF OF CLERICAL BUREAU:—Please have me reminded on above date of

.....

.....

.....

Do you want Case to be sent you with this reminder?.....

This Date.....191... Signed.....

NOTE:—Please make use of this form as a means of being reminded of engagements to call or promises to advise, calls to be made by principal at Claim Department offices, of letters to which reply is expected, of papers to be returned, of work which it is desired to complete or review by a fixed time, cases with which it is desired to keep in close touch, etc. This reminder will be placed before you on the date which you name.

REMINDER FILE MEMORANDUM

PITTSBURGH RAILWAYS CLAIM DEPARTMENT—FORM 6—REMINDER CARD FOR CALLING MATTERS TO ATTENTION OF EMPLOYEES AT DESIRED TIMES

Form 25 C. D.—5M-4-13

PITTSBURGH RAILWAYS COMPANY

CLAIM DEPARTMENT

No.....This Date.....1913

Mr. .....

will call to see Mr. .....

.....1913.....M.

(Day of Week) (Date) (Time)

For .....

.....

Principal .....

Signed.....

Called.....No Record of Call to .....

(Date) (Date)

PITTSBURGH RAILWAYS CLAIM DEPARTMENT—FORM 7—RECEPTION ROOM CARD NOTIFYING RECEPTION ROOM CLERK OF EXPECTED CALLERS

DIVISION OF LABOR IN CLERICAL BUREAU

To show the careful division of labor in the clerical bureau among the different employees, it may be noted that there is a general index clerk to handle the general index and an information clerk to look out for the information file. The classification clerk classifies all accidents according to twenty-two general divisions and 125 subdivisions and gives each one the number that shows on the accident register and in the case records. The index clerk operates the cherry-card file and the reminder-card file. The trace clerk is used to hunt up the data on past cases, locate files and number and dispatch incoming letters and memoranda. The reception room clerk receives callers, records the time and keeps the reception room card file. The photographer's clerk classifies all photographs, assignments and photographic records. The copy clerks work in the litigation bureau, and, when a suit is entered, make two copies of all documents, one going to the general attorney, one to the men in the litigation bureau and the original back to the vault. This general vault is in charge of a separate file clerk, who is responsible for recording on the cherry cards all documents that leave the vault. The record clerk has charge of the accident register. Besides these and a messenger, there are five clerks and stenographers who are located in the various bureaus but are under the supervision of the chief of the clerical department.

NOVEL LIBRARY FEATURE

A novel and original feature has recently been added to the department. A hallway, 8½ ft. x 50 ft., has been partitioned off, the walls decorated and lighting fixtures installed. The room is fitted with "Crex" rugs, bookcases, easy chairs, magazine racks and telephone, and made generally but inexpensively attractive. It is used during the day as a reception room for callers, and the framed pictures advantageously placed add attractiveness and at the same time serve to impress certain facts upon claimants. As compared with the old idea of having the first room visited by a claimant represent poverty by its bare floor and wooden furniture, this feature of reversing the impression into one of comfort, attention, courtesy and resources for defense against unfair claimants, is a distinct departure. After business hours this library-reception room is used by the members of the department as a place in which to work, read, study, lounge or meet their friends. Hereafter the various meetings of the department will be held here.

GENERAL FACILITIES

The department occupies fifteen rooms and vaults, all neatly and attractively equipped and maintained. All filing and other equipment is modern and sanitary. Washstands, individual towels, sanitary water coolers and drinking cups, shoe shining cabinets, telephone booths, scientific lighting fixtures and general neatness serve to impress employees and others that this is a modern business organization which gives and demands respect. Intercommunicating telephone equipment with a loud-speaking master station in the superintendent's office allows him to get in instantaneous touch with any bureau or all of them at once.

The library of the Bureau of Railway Economics, Washington, D. C., has recently prepared an exceptionally complete list of references in current periodicals to the jitney bus and to regulatory measures that have been introduced to curb the irresponsible factors in the movement. There are about 140 articles indexed in the list, of which nearly 40 per cent are from the ELECTRIC RAILWAY JOURNAL. The bibliography is dated July 15 and is in mimeograph form, a limited number of copies being available for distribution.

Employees Receive Increase in Chicago

Reduction in Number of Years to Reach Maximum Wages Also Made by Decision — James M. Sheean, the Company's Representative, Files Dissenting Opinion

Mayor Thompson and State's Attorney Hoyne, representing the majority of the Chicago Board of Arbitration, handed down an award on July 16 granting a uniform increase of the maximum and minimum wage of 3 cents for the first year and 4 cents for the second year of the contract, and also a reduction of the graduated scale from a five-year to a four-year term. Employees outside of the train service also received substantial increases, and the award includes some concessions in the working conditions. Attorney James M. Sheean, representative of the surface lines, filed a dissenting opinion which shows that, despite the preponderance of evidence presented by the railway companies tending to show that the demands of the employees were excessive, the majority of the board of arbitration granted wage increases and improvements in working conditions. One compensating fact in the decision is that the city must share 55 per cent in the increased operating expenses and that the employees' demand that a graduated scale be abolished was not sustained but reduced from a five-year to a four-year term.

Findings on Seven Questions Submitted

The decisions of the board of arbitration regarding the seven questions submitted are as follows:

To Question 1—Percentage of straight runs and consecutive hours in which swing runs shall be completed. The arbiters decided that all runs on Sundays should be straight time and should not exceed nine hours.

To Question 2—Hours of service, including week days, Sundays and holidays, for employees other than trainmen provided for in the agreement. The arbiters decided that the existing system should be continued except as it might be modified by the other points decided in this arbitration.

To Question 3—Number of years to receive maximum wage scale and wages for all trainmen, including trainmen on cinder, sprinkler, supply and other cars. The arbiters decided that during the period fixed by this award the following scale of wages should govern:

First Year of Contract

	Old Scale, Cents	Offered by Company, Cents	Demanded by Men, Cents	Award, Cents
First year:				
First three months	23	25	33	26
Second three months	25	26	33	28
Second six months	26	27	33	29
Second year:				
First six months	27	28	36	31
Second six months	28	29	36	31
Third year	29	29½	36	32
Fourth year	30	30	36	33
Fifth year	31	31	36	35
Sixth year and thereafter	32	32	36	..

Second Year of Contract

	Old Scale, Cents	Offered by Company, Cents	Demanded by Men, Cents	Tentative Draft of Award, Cents
First year:				
First three months	23	25½	33	27
Second three months	25	26½	33	29
Second six months	26	27½	33	30
Second year:				
First six months	27	28½	36	32
Second six months	28	29½	36	32
Third year	29	30	36	33
Fourth year	30	30½	36	34
Fifth year	31	31	36	36
Sixth year and thereafter	32	32	36	..

The scale of wages shown in the foregoing table also applies to motormen of sprinklers, cinder, supply, mail and other cars. Trolley boys or conductors on sprinkler, cinder, supply, mail and other cars will receive a wage of $2.30 per day. All men working on snow plows and on snow sweepers will have a wage rate of 36 cents per hour. The wages of other employees decided by the board of arbitration are as follows:

	Month
Car repair foremen (day)	$125
Car repair foremen (night)	110
Receivers	105
Tunnel and bridge men	75
Flag and crossing men	65

Mechanics in west side shops not under union contract will get a 3 cent an hour increase.

Car repairers, motor repairers, inspectors, dopers and body repairers will receive $2.40 in the first year of service, $2.70 in the second year, and $3 in the third year.

Car placers, $2.40 in the first year of service, after that $2.75 a day.

Cleaners, janitors, washers and other line men, $2.10 a day in the first year of service and $2.40 thereafter.

To Question 5—Allowance for turning-in time. The arbiters decided that all trainmen should be allowed to have seven minutes after finishing the day's run for turn-in time, which was an increase of two minutes.

To Question 6—Seniority and efficiency with men outside of train service. The arbitrators found that in all cases where men were laid off to reduce the force, this should be done according to seniority primarily, but consideration might be given to their capacity and fitness. When these men are again put to work they should be reinstated according to their seniority standing at the time they were laid off.

To Question 7—Night car hours and wages. The arbitrators found that the men operating night cars should receive $3 per night for eight hours or less, and all-night car runs should be straight and not more than eight hours. The night-car wages and hours specified in this award become effective on Jan. 1, 1916.

Dissenting Opinion of James M. Sheean, the Company's Representative

"I dissent from the award made by the majority of the board.

"My position throughout this arbitration has been that the employees are entitled to a fair wage fully commensurate with the work performed, but I submit that these men are already paid not only a fair wage but a liberal wage when the wages in the same employment and the living conditions in other large cities are taken into consideration, or when comparison is made of annual earnings of these men with the earnings in any comparable line of work in Chicago.

"The evidence in this case shows beyond all question that the wage scale paid the trainmen in Chicago, taking into account the bonus time, including time for meals allowed, is higher than the wage scale in any other large city east of the Rocky Mountains. The scale in Chicago, taking into account the bonus time allowed the men, gives a higher average wage than that paid in any of the twenty cities the wage scales of which were submitted to the board of arbitration.

"Sixty per cent of the trainmen in the employ of the company are now receiving the maximum rate of 32 cents per hour, and their average earnings are in excess of $1,000 per annum. Many of these men are now earning in excess of $100 per month, or more than $1,200 per annum. Compare these earnings with the

earnings of carpenters in Chicago, who are employed only about 160 days a year, and whose earnings are about $800 per year.

"This situation is shown by the following extract from a letter dated April 23, 1915, written by John A. Metz, president of the carpenters' arbitration board, to the State board of arbitration:

" 'Now, a few years ago the average carpenter worked about 200 days per year, but now by reason of the evolution in the building industry, this average is cut down so that the average carpenter now earns little more than $800 per year.'

"The same basis of annual earnings applies also to the other building trades in Chicago.

"Or, take the compensation received by men employed by the city. The evidence shows that the average monthly wage of 4589 employees upon the payrolls of Chicago for the month of May, 1914, including such men as foremen in the street department, officers in the health department, laborers, motor drivers, etc., was $55.18.

"The evidence in this case shows and, in fact, there is no dispute, that the cost of living in Chicago is materially lower than the cost of living in such cities as New York, Boston and Philadelphia, although the wages paid trainmen in Chicago are higher than the wages paid trainmen in any of those cities.

"The evidence is also uncontradicted that the cost of living since the last award three years ago has not increased as fast as the wages of the employees. The record shows that the wages of the trainmen have increased during the past three years 9.2 per cent, while the cost of living, according to the statement submitted by Mr. Mahon in 1912, and compared with a similar statement filed by him in this arbitration, has increased only 5.34 per cent.

"In 1909 the men voluntarily agreed with the companies upon a five-year scale. This was submitted to arbitration in 1912 and again fixed at the period of five years. Experienced operating men called on behalf of the company stated that the best results from every standpoint were obtained from a five-year scale and that the purpose of this scale was to compensate the men for their gradually increasing efficiency and give them a reward for remaining in the service.

"Evidence introduced shows that the average length of the scale in twenty of the principal cities of the United States is over five years. In fact, a graduated scale for teachers in force in our public schools ranges from five years to ten years. Notwithstanding this, however, the majority of the board reduced the scale from five years to four years.

"Prior to 1912 there was a limited night car service in effect on the north and west sides of the city. These men worked six hours and were paid a bonus or extra rate for this service. No such arrangement has ever existed on the south side. The effect of the night car bonus was to penalize and make still more costly an unprofitable service. The result was that on the south side lines, where no penalty was imposed, the night car service developed to a far greater extent than on the north and west sides.

"In the 1912 arbitration the night car bonus was abolished throughout the city, and Judge Carter in discussing this question, in his opinion, said:

" 'Extra pay or a bonus for night car service has been in force for years on the north and west side lines of this city, but it has not been on the south side lines in recent years, or to any substantial extent since electricity was introduced as a motive power. Whatever might be said in justification of this plan in the days when horse cars were in use, I can find no evidence in this record that furnishes a valid reason why the men who operate the cars between twelve o'clock midnight and six in the morning under the present operating conditions, should receive more pay than the men who operate the cars at other hours of the twenty-four. Electricity so lights up the streets that it is practically as easy for the motorman to see the track ahead of him at night as in the daytime. Then, too, the evidence shows that the character of the traffic during the night in recent years has changed materially. I am of the opinion that greater skill and experience is required in the operation of cars during the rush hours of the morning and evening than for the operation of night cars.'

"The majority of the board, however, has restored the old plan of paying a bonus for the operation of night cars. The result of this will be to impose a heavy additional burden upon the company and in such a way as to retard rather than to develop this class of service.

"The majority of the board has also given a corresponding increase to the carhouse men and shop men. The evidence in the record shows that the pay already received by these men is materially in excess of the wages now being paid even by the steam roads for the same class of service. The majority of the board has also, by its ruling, still further increased the bonus or dead time allowance for which the men are at present paid, and which already amounts to more than $1,000,000 per annum. All of these matters must be taken into account in determining the actual pay which the employees of the company will receive under this award, and the actual amount as shown is very materially in excess of the actual figures appearing in the scale.

"Common observation and experience show that the present is no time for drastic wage increases in any business. This is particularly true with reference to the company, which has been affected to a greater degree than most institutions by the general financial and industrial depression now existing in Chicago. Last year the receipts fell more than $500,000 below the receipts of the preceding year, and during the first five months of the present year the company's receipts have dropped more than $600,000 below the receipts for the same period last year.

"The company is carrying fewer passengers this year than last year, and its receipts per car-hour have decreased accordingly. On the other hand, as a result of the graduated scale under which the men are now working, their wages are automatically increased the longer they remain in the service, so that the company is now facing not only a heavy deficit in its gross receipts and decreasing receipts per car-hour, but a constantly increasing wage.

"In the face of this, however, the majority of the board has not only shortened the scale from five years to four years, which in itself operates to increase the wages of the men, but has further increased the maximum wage per hour during the first year of the new contract from 32 cents to 35 cents, and during the second year of the contract from 32 cents to 36 cents. The maximum demand of the men in 1912 was 35 cents an hour, and the maximum demand at this time was 36 cents an hour. In other words, the men have been given substantially all they asked for, yet no one will seriously contend that the men in making a demand for 36 cents an hour expected to receive that amount, or anything like that amount.

"It must not be forgotten that the situation with the company is very different from that of a manufacturing concern, or even that of a steam road. An increase in the wages among the employees of manufacturing con-

cerns means an added cost to the manufactured product. An increase in wages to the employees of our great stores means only that the purchaser will pay an increased price for the articles purchased, and even a steam road has some opportunity to increase its rates; but not so with the company.

"The fare received by the company for the service rendered by it is 5 cents and no more. The company's compensation is fixed. On the other hand, the cost of rendering the service, the increasing cost of wages, the increasing expense of maintenance and operation are constantly narrowing the margin left for the return upon capital.

"Recognizing, as I do, that the service rendered by the company is the joint product of labor and capital, and believing, as I do, that both labor and capital should have a fair return, it has seemed to me that this award so unfairly increases the proportion of the one at the expense of the other that its result must be to make Chicago an unattractive field for capital.

"Chicago needs capital and must compete with other cities in procuring capital for its development, and in the last analysis the determining factor will be the fairness or unfairness with which investments already made in this city are treated.

"One difficulty with which the arbitrators have had to contend was lack of time to enable the board to take up and properly analyze this record, which contains a vast amount of facts, figures and details. We have had but four conferences in this entire matter, and at only two of these conferences were the merits of any of the men's demands discussed, and then only those with reference to wages and length of the scale for trainmen. No discussion whatever was had with reference to the other six propositions submitted to the board of arbitration.

"The agreement under which this arbitration is had provides that the board shall meet and organize, set the time and place for hearings, and continue 'until all evidence and arguments have been heard and rulings rendered.' This means that whatever evidence was heard should be submitted before the board at a regular meeting, at which all parties were represented. Contrary to this, and to all established principles of arbitration, the Mayor, against my protest and the protest of Mr. Hoyne, the representative of the men, saw fit to call in some 200 employees whose wages were directly involved in the arbitration, and questioned some of them himself, and had others questioned by representatives of the corporation counsel's office with reference to the issues involved in this arbitration—all without the principals being present or represented.

"In the case of Moshier vs. Shear, 102 Ill., 173, our Supreme Court said:

" 'After being selected, it is the duty of an arbitrator, like a juror, to act fairly and impartially between the parties and on the evidence adduced before them on the trial, and entirely independent of all outside influences, and what will be misconduct on the part of a juror will, as a general rule, be such on the part of an arbitrator. Neither has a right to learn facts except as brought to his attention on the trial. It is gross misconduct for either to seek evidence or the opinions of others in regard to the case, or anything material to its decision in another mode.'

"The company, in view of the great public interest involved and the possible effects of such course upon the best interests and welfare of this community, has decided not to avail itself of its legal rights in this particular.

"I have endeavored to state my views frankly. I cannot concur in this award. I cannot concur in the method by which the award was reached; but, notwithstanding this, the company which I represent, wishes it distinctly understood that this award will be accepted and faithfully carried out. The company has stood, and will continue to stand, for the principle of arbitration, regardless of whether the outcome in any particular arbitration favors one side or the other."

(Signed) JAMES M. SHEEAN.

STATEMENT BY CHICAGO SURFACE LINES

As an aftermath to the arbitration award the Chicago Surface Lines ran an advertisement in each of the Chicago papers under the caption, "Car Men Win." In this the company accepts the victory of the employees "like a good sport" and takes advantage of this propitious occasion to take up the question of complaints, and asks the public to criticise and commend. The text of this advertisement is so unusual that it is printed in full as follows:

CAR MEN WIN

In the most sweeping award ever made by an arbitration board, our employees have just won an increase in wages which makes them by far the most highly-paid street railway men in the United States.

This award has imposed an enormous additional burden upon the company—approximately $1,500,000 per year. We have accepted the award and shall carry out its provisions faithfully. This company always has stood for and will continue to stand for arbitration, regardless of whether the outcome in any particular instance favors one side or the other.

WHAT THE RESULT SHOULD BE

The men have been given substantially everything that they asked for—and far more than they expected.

This removes all possibility of complaint on the part of the men that they are not being fairly treated by the company, or that they are not getting a fair share and more than a fair share of the joint product of labor and capital.

There should be, and there will be, a better feeling on the part of the men toward both the public and the company. This ought to bring about, among other things, better service to the public.

WHERE THE PUBLIC COMES IN

Four-fifths of the complaints received by the company have to do with the treatment of the public by our employees—complaints involving the personal equation—such as discourtesy, running by passengers, starting too quickly, not waiting for passengers at transfer points, etc.

Every complaint of this nature should now be eliminated. We shall appeal to every man in the train service to co-operate with the management in every way possible to give a better service than ever before, and particularly to be mindful at all times to extend to our passengers every courtesy and consideration to which they are entitled. We believe that the great majority of our men will respond loyally to this appeal.

THE PUBLIC MUST HELP

We ask the public to keep us advised constantly of the kind of treatment they are receiving from our employees.

A part of the service for which the public pays is courtesy and consideration on the part of the trainmen. These are just as essential to good service as keeping the cars on regular schedule.

We therefore ask the public to help us improve the service along these lines—first by calling our attention to acts of courtesy or consideration for the welfare of passengers which they consider worthy of mention; and, second, by calling our attention to every act of *discourtesy* or *lack* of consideration.

If the public will co-operate with us fully in this regard, we will undertake to see that credit is given where credit is due and that all complaints are investigated promptly and the proper remedies applied.

EFFECT ON OTHER CHICAGO LINES

It has been decided that the award to the employees of the surface lines will not affect the negotiations between the Elevated Railways of Chicago and its employees. By a separate agreement this company consented to arbitrate all disputed questions with its employees and that Mayor Thompson should act as umpire. Negotiations to eliminate some of the minor problems are being conducted by President Britton I. Budd and the union officials. Mayor Thompson will not return from a trip to the Coast until early in August, hence it will be at least until that time before actual arbitration hearings can be conducted. In the meantime the company is collecting data, but as yet neither it nor the employees have announced the names of their representatives on the board of arbitration. Practically all the questions which were submitted to the surface lines' board will be taken up in the arbitration of the elevated railways' difficulties, but in addi-

tion to these many other classes of employees are involved, therefore the evidence to be presented will be more complicated.

By prior agreement the Chicago & West Towns Railway will accept the award granted the employees of the Chicago Surface Lines in so far as it affects the question of wages and the term of contract. In this agreement working conditions were considered as a local problem and will be disposed of this week in a conference between General Manager F. L. Butler and representatives of the employees. Approximately 230 employees will be affected.

The Evanston Railway Company, Evanston, Ill., also by prior agreement with the employees, is bound to accept the Chicago Surface Lines' arbitration award in so far as wages and term of contract are concerned. The working conditions in this case were also considered a local problem and will be negotiated as quickly as possible. Forty-five employees will be affected.

Advertising Car in Boston

For the purpose of stimulating traffic during the summer months the Boston Elevated Company is conducting an interesting publicity campaign that includes some original ideas. The most unusual feature is a single-truck car on each side of which are carried three large oil paintings more than 6 ft. square that are both striking and artistic.

These paintings advertise points of interest in the vicinity of Boston reached by lines of the Elevated Railway Company and connecting companies. The pictures are done in poster style by Fred C. Sanborn, a well-known decorative artist of Boston, and are of a higher order of artistic excellence than is ordinarily found in advertising paintings. Out-of-door life and attractions, that make a strong appeal to most people during the summer months, furnish the theme for each of the paintings, and the work has been done with a few strong, harmonious colors that produce a highly decorative effect and compel attention.

Franklin Park, a city-owned recreation park, contains among other attractions three performing elephants that were purchased by Boston's school children and given to the city. These have been used for the subject in the picture advertising that resort. Norumbega Park on the Charles River is represented by a young couple paddling a canoe, together with a circular insert showing a brightly costumed dancer in the spotlight on the stage of the open-air theater.

Two children playing in the sand on the beach at Marine Park, South Boston, is the principle subject of another painting, in which there is inserted a striking picture showing the brilliantly hued tropical fish that are exhibited at the aquarium included in this park. Another picture advertises Lexington Park and shows a young couple dancing in the pavilion and contains in one corner a picture of the head of a buffalo of the zoo. On each side of the car in the central square is a large map showing points of interest that may be conveniently reached by short trolley trips and indicating the route and connection by small lines in the usual style of map drawings.

The car is illuminated by a row of overhead lights at night and although put in operation for the first time Tuesday, July 13, has already attracted a great deal of attention and resulted in extensive newspaper notices.

Besides the advertising car the company is publishing a series of small 1-in. single-column display advertisements on the front page of the Boston daily papers. These advertisements are run every Sunday and every other day on week days in each of the papers. They call attention to places of interest in short, pithy sentences in simple, direct language.

Animals, Birds and Fishes

Interesting collection of birds and animals may be found at Franklin Park, Norumbega Park, Lexington Park and Middlesex Fells. A remarkable collection of brilliant hued fish may be found at the Marine Park Aquarium. These are all delightful places for spending a summer afternoon or evening.

CHILDREN'S OUTINGS

Take the children to see the animals and birds at Franklin Park, Norumbega Park and Lexington Park and the fishes at Marine Park. These parks are beautiful, cool and safe for children.

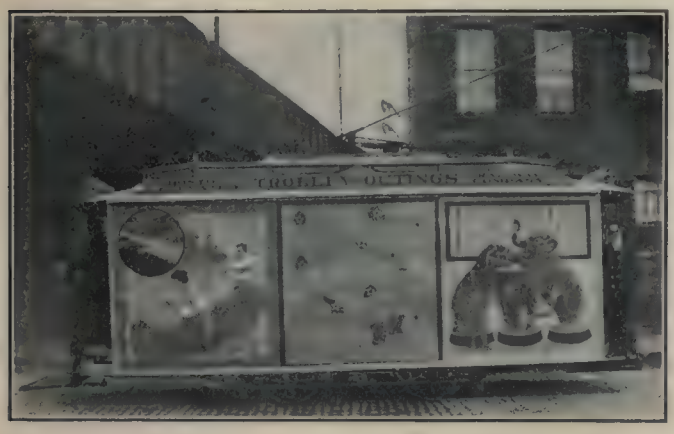
GO TO THE WOODS

There are many beautiful tracts of woodland within a few miles of Boston famous for their charm, including Middlesex Fells, Stony Brook Reservation, Norumbega Park, Blue Hills, Dorchester Park and Lexington Park.

TYPICAL CARDS CARRIED IN BOSTON DAILY PAPERS

The company is also using large 5-ft. x 7-ft. printed posters mounted upon upward of 150 billboards owned by the company on different parts of the system. These posters enumerate various points of interest on the company's and connecting lines and announce the attractions to be found at each place. The posters are changed monthly.

The newspaper and billboard advertising campaign was begun about June 1 and will be continued during the months of extensive pleasure riding.



ADVERTISING CAR USED IN BOSTON TO STIMULATE SUMMER TRAFFIC

ANNUAL CONVENTION SAN FRANCISCO OCTOBER 4 to 8, 1915

American Association News

ANNUAL CONVENTION SAN FRANCISCO OCTOBER 4 TO 8 1915

Director of Transportation McConnaughy Gives Further Details Regarding Convention Trains — Manila Company Section Meeting—T. & T. Association Committee Discusses Uniform Definitions

CONVENTION TRAINS

In connection with the distribution of detailed information regarding the Red and Blue Specials (tour trains) and the White Special (one-way train) which will be given in circulars to be mailed on July 26, H. G. McConnaughy, director of transportation, calls attention to the following points:

Each special is limited as to the number of passengers, consequently it is most important for those who intend joining any of the tours to make their reservations immediately upon receipt of the itineraries. The requests already received from railway officials assure the success of the convention. The fact that arrangements have been made in cities en route for meetings with officials of the local railway companies makes this an exceptional opportunity for Railway Association publicity and gives the manufacturer and his representatives an opportunity of making new friends and renewing old acquaintanceships.

The members of the Railway Association and those of the Manufacturers' Association should keep in mind that this is the first opportunity that these associations have had to visit, as associations, the member companies in the Far West.

The transportation committee hopes that the railway officials and manufacturers will divide the men whom they contemplate sending between the Red and the Blue special trains, and that the members of both associations will take their families with them. Special arrangements have been made for the comfort and convenience of ladies and children. For the convenience of the members hotel accommodations en route (but not including San Francisco) have been provided for and the cost included in the prices of the tours.

Members and guests living in cities and towns not shown in the itineraries can make transportation arrangements from and to their home towns on any of the tours.

Information regarding costs or routing can be obtained by addressing the director of transportation, Suite 1002, 165 Broadway, New York City.

MANILA COMPANY SECTION

The regular meeting of the joint A. E. R. A. and N. E. L. A. company section No. 5 was held in Manila on June 1.

W. A. Seten of the electrical department presented a paper entitled "How to Increase the Sale of Electric Appliances, or Getting Business for the Electric Department," and W. D. Calfee, night carhouse foreman, presented one on "Personal Efficiency." After the discussion of the papers, C. N. Duffy, vice-president Manila Electric Railroad & Light Company, announced that the company will award substantial cash prizes for the best three papers read before the company section during the calendar year 1915, under conditions to be determined by the section. Company officials and managers of departments are not eligible to compete. The secretary, W. A. Smith, announced the program for the July meeting, consisting of papers on "How a Claim Agent Earns His Salary," "The Electric Motor vs. All Comers," and "The Necessity of Shouldering Your Own Responsibility." The names of several leaders in the discussion of each paper were also announced.

In his paper Mr. Calfee first quoted Harrington Emerson's definition of personal efficiency as "the mental and physical ability to find and take the best, easiest and quickest way to the desirable things of life." He then proceeded to apply this to the practical work of the railway man, stating that exact knowledge, guesswork and efficiency will not pull together. "Precision," said he, "is impossible without prevision." The railway man should get the best papers and magazines on his particular business and see what is being done elsewhere, whether his own practice is up to standard or not. The personal efficiency of an individual is affected by his environment, his aptitude and his mental attitude. When men realize that efficiency never has to go begging for advancement, and that the man who masters his trade goes to the top, we will see more efficient men. Personal efficiency is also personal independence. Mr. Calfee's paper illustrated the principle of efficiency and it brought out a lively discussion.

T. & T. ASSOCIATION COMMITTEE ON UNIFORM DEFINITIONS

A meeting of the committee to develop uniform definitions of the American Electric Railway Transportation & Traffic Association was held in New York on July 13. Further consideration was given to the definitions in pursuance of the plans made at the meeting on June 25. H. C. Donecker, the chairman, and William C. Greenough were present. Additional work on the definitions will be done by the members of the committee by correspondence.

Pamphlet Issued by Secretaries' Society

The Society of Technical Associations' Secretaries, to the formation of which reference was made in earlier issues of the ELECTRIC RAILWAY JOURNAL, has issued a pamphlet containing the proceedings of the meeting held in New York on Feb. 27, 1915. Membership in this society is open only to individual secretaries of technical associations, but for all practical purposes the result is the same as if the associations were members, with the advantage that official action is not necessary in connection with the deliberations of the society. Harry D. Vought, secretary New York Railroad Club, is president; F. L. Bishop, secretary Society for the Promotion of Engineering Education, is first vice-president; Charles W. Hunt, secretary American Society of Civil Engineers, is second vice-president, and Bradley Stoughton, secretary American Institute of Mining Engineers, 33 West Thirty-ninth Street, New York, is secretary. The names of E. B. Burritt, secretary American Electric Railway Association; F. L. Hutchinson, secretary American Institute of Electrical Engineers; C. W. Rice, secretary American Society Mechanical Engineers, and Edgar Marburg, secretary American Society for Testing Materials, appear in the list of twenty-three charter members.

The Leuk-Leukerbad electric railway in Switzerland was put in operation on July 3. It is 6½ miles in length and construction was begun in 1912. The road cost $600,000 to build.

COMMUNICATION

The Jitney vs. the Trolley

SARANAC LAKE, N. Y., July 7, 1915.

To the Editors:

James E. Hewes' paper "Jitney Bus Competition," an abstract of which appeared in your July 3 issue, will without doubt be taken by the jitney interests as sure proof that the bus is a cheaper method of city transportation than the trolley car. However, cost of operation per car-mile is not the only factor to be considered. Earning capacity is one of as great if not greater importance. Otherwise the Ford jitney would surely drive out the trolley and would as surely be driven out in turn by the jitney motorcycle or side car.

Even assuming Mr. Hewes' figure of 21.8 cents per bus-mile and his sixty-seat trolley car that operates at 27.3 cents per car-mile, including taxes and fixed charges (the average figure for the United States as obtained from the last census report) it can be shown that the bus is the more expensive to operate. Let N represent the number of car-miles operated on the system per hour for eighteen hours daily and three hours for the rush period when all the seats of the car will be required. Then for three hours a day the bus will have to operate three times as many car-miles as the trolley, due to its small seating capacity of twenty-two. For the whole day the bus operating charges in cents will be $21.8(60/22 \times 3N + 15N) = 505N$. For the trolley the costs will be $27.3 \times 18N = 492N$, which gives the trolley a saving of $13N$ cents a day. If during the rush period more car-miles an hour are run, as is usually the case, or if for more than three hours at least 37 per cent of the seating capacity of the trolley is used, then the saving will be still more marked, as I have used figures that give the bus every advantage.

As is so often the case, London has been cited as an illustration of the profitable operation of buses. Referring to the ELECTRIC RAILWAY JOURNAL for May 8, page 869, we find actual working figures as given by three British municipalities 32 cents, 25.4 cents and 28.8 cents per bus-mile. "Authentic figures lower than this are not available. The London bus company refuses to give its costs because of competition." These figures would not seem to indicate that bus operation in England was as profitable as supposed, although London, because of its narrow and congested streets, offers an exceptional field for the bus.

The estimate of 21.8 cents per bus-mile, as given in Mr. Hewes' paper, seems low in the light of English experience. Taking the figures given in the article on cost of bus operation in the ELECTRIC RAILWAY JOURNAL for Feb. 27, page 414, and changing them to conform with values given by Mr. Hewes for first cost of bus and for cost of gasoline, there is obtained an average of 24.9 cents per bus-mile for nineteen companies. Accordingly 21.8 cents per bus-mile seems very optimistic.

Likewise in taking $35,200 as the cost of a trolley car ready to run a high figure has been used, except for interurban service. In the case of Massachusetts, where the percentage of interurbans is low, and where capitalization represents actual costs because of regulation, there appears a total cost of construction and real estate of $194,677,690 for 7208 cars equipped with motors ready to run. This gives a cost of $27,000 per car.

In the light of these facts the 5-cent motor-bus companies should have some difficulty in proving their case of more economical operation than the trolley. And since the several recent failures of motor-bus companies capital ought to require more than guess-work figures before investing. F. DEWEY EVERETT.

Newark Terminal Cornerstone Laying

On July 20 the cornerstone of the $5,000,000 terminal, which is under erection in Newark for the Public Service Corporation of New Jersey, was laid by President Thomas N. McCarter with appropriate ceremonies in the presence of a distinguished audience. The plan of this terminal was fully described in the issue of the ELECTRIC RAILWAY JOURNAL for Nov. 28, 1914, page 1190, and an illustrated progress report was given on page 793 of the issue for April 24, 1915. After depositing a dash of mortar with a silver trowel and rapping the great stone with a mason's mallet Mr. McCarter said: "I have truly laid the cornerstone of this building which, when completed, it is hoped will serve this community and others for years to come." Music for the occasion was furnished by a large band of trainmen of the Essex division of the Public Service Railway.

After the exercises at the building site the 200 or more guests were served with luncheon at a near-by restaurant and brief addresses were made by Mr. McCarter, Mayor Raymond, Senator Austen Colgate, ex-Senator James Smith and ex-Governor Franklin Murphy. At the luncheon were also other prominent public men and financiers, making a remarkable local civic gathering.

NEWARK TERMINAL—PARK PLACE TERMINAL, SHOWING GENERAL REAR VIEW OF BUILDING

Equipment and Its Maintenance

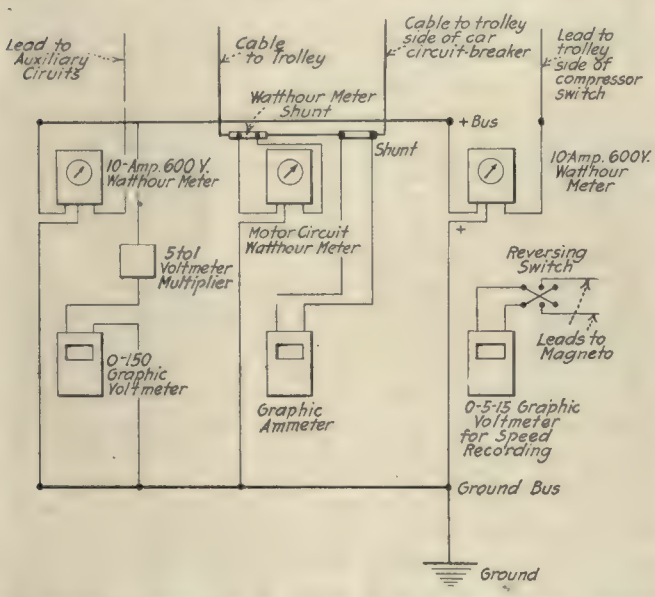
Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

(Contributions from the Men in the Field Are Solicited and Will be Paid for at Special Rates.)

Portable Car Testing Set

BY D. D. EWING, ASSISTANT PROFESSOR OF ELECTRICAL ENGINEERING, PURDUE UNIVERSITY

A convenient and compact car-testing set has been used at Purdue University in making a number of tests on electric cars within the last couple of years. This set, which was designed for compactness, portability and convenience of connection, consists of three graphic recording instruments and three watt-hour meters mounted on a suitable test stand. The wiring, a simplified diagram of which is given below, is placed on the back of the board upon which are mounted the watt-hour meters. The graphic meters are mounted on a spring-suspended shelf. Felt pads are fastened to the bottoms of the stand legs to further minimize vibration. The stand is of such size that it may readily be placed in the baggage compartment of an interurban passenger car, thus permitting tests to be made on the car while it is operating in regular service. When used in testing city cars, a section of the car in which the stand is placed is blocked off to prevent passengers from getting in the way of the test crew and to keep them away from the live circuits.



CAR-TESTING SET—DIAGRAM OF CONNECTIONS FOR METERS AND SWITCHES

Esterline graphic meters are used. One graphic voltmeter is used to measure the voltage between trolley and ground, and another, in connection with a magneto generator, is used to measure the speed of the car. As usually connected the graphic ammeter measures the motor-circuit current only, although the connections can easily be arranged so that it measures the total car current. By means of a system of change gears in the chart drive, ten chart speeds, ranging from ¾ in. per hour to 12 in. per minute can be secured. While the timing with the higher speeds is not at all accurate these speeds are of particular value in studying "notching up" operations and starting-resistance adjustments. By means of flexible couplings the chart-driving rolls of all three meters can be mechanically coupled together thus insuring synchronous chart movements. The ammeter is provided with several shunts, that shunt being selected for a given test which will give on the car starting current an indication over about three-fourths of the meter scale.

The magneto generator which forms part of the speed-recording apparatus is of the low voltage d.c. type. It is mounted on the truck and is chain-driven from a sprocket wheel mounted on an extension of one of the car axles. This method of magneto drive has proved successful for car speeds as high as 70 m.p.h. The speed-recording apparatus is also quite accurate. During tests the accuracy is occasionally checked by timing the distance between mile-posts with a stop watch. In all of the tests that have been made so far the two methods have given results that have agreed very closely.

Sangamo railway-type watt-hour meters with special reset dials are used. These dials have a high large-hand speed and the large hand may be reset at the end of each run without interfering with the small-hand dial records. The meter which is used to measure the energy input to the motor circuit is provided with several shunts, the shunt used in a given test depending on the capacity of the electrical equipment of the car under test. As shown in the wiring diagram, one of the 10-amp meters is used to measure the input to the air-compressor motor and the other the input to the remaining auxiliary circuits. Obviously the meter connected in the compressor circuit might be used to measure the energy input to any other auxiliary circuit.

Data taken with this set enable accurate conclusions to be drawn relative to the adequacy and efficiency of the electrical equipment of the cars and distribution system of an electric railway.

An Inexpensive Method of Treating Boiler Feed Water

BY T. R. CRUMLEY, SUPERINTENDENT OF MOTIVE POWER EVANSVILLE RAILWAYS

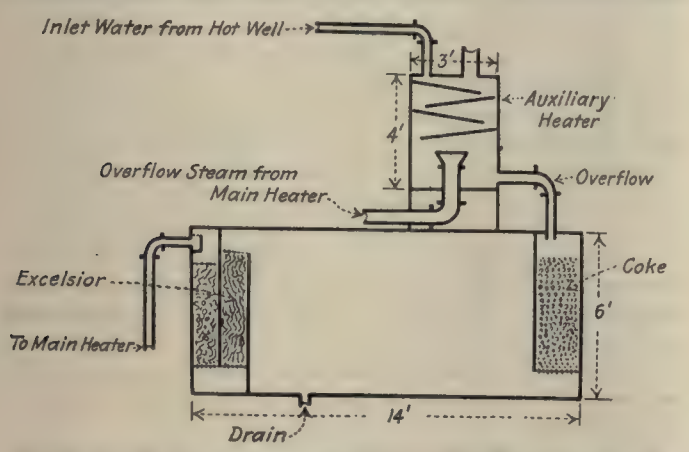
The Hatfield power house, which furnishes a part of the power used by the Evansville Railways, is equipped with a barometric type of condenser, an open type of feed-water heater and two 400-hp. Babcock & Wilcox water-tube boilers. The water for condensing purposes was originally secured from a small stream, but several months ago it became necessary to abandon this stream and to drive wells in order to secure an adequate supply of condensing water. Due to an increase in the station load, the feed-water heater became too small and it was possible to heat the boiler feed water to a temperature of only 170 deg. Fahr. A part of the exhaust steam entering the heater was not condensed.

Soon after the wells were placed in operation trouble was experienced from an excessive amount of scale deposited in the boilers. A chemical analysis of the water was made in order to determine the kinds and amounts of scale-forming impurities contained, and the amounts

and kinds of chemical reagents required to precipitate these impurities before the water entered the boilers. This analysis proved that the water was very hard, the principal impurities being the carbonates and sulphates of magnesium and lime. It was further determined that the necessary amounts of chemical reagents required to soften the water were as follows: 1.56 lb. hydrated lime per 1000 gal., and 0.2 lb. soda ash per 1000 gal.

As it was not considered advisable to install an expensive softening plant at this time, it was decided to build a tank in which to treat the water used for boiler purposes. This tank, shown in the accompanying diagram, was built of tongued-and-grooved cypress 2 in. thick. It is 14 ft. long, 6 ft. wide and 6 ft. deep. In order to utilize the surplus exhaust steam not condensed in the hot-water treater, it was also decided to build a small auxiliary heater, also shown in the diagram. This auxiliary heater serves the double purpose of increasing the temperature of the water at the time it receives chemical treatment, thereby making the treatment much more effective, and also raising the final temperature of the water entering the boilers.

The auxiliary heater was constructed of ¼-in. x 2-in. x 2-in. angle iron and No. 12 gage galvanized sheet iron. The surplus steam from the main heater enters at the bottom of the auxiliary heater and circulates through and around perforated, removable trays. The water from the hot well is pumped by means of a small tank pump into the top of the auxiliary heater, where it is distributed over and filters through the perforated



HOME-MADE PLANT FOR TREATING BOILER FEED WATER

trays, thereby coming in contact with the steam. The water leaves the auxiliary heater at a temperature of 170 deg. Fahr., and falls by gravity into the treating tank. It is first caused to filter through a chamber packed with coke from which it passes into the main section of the tank. This chamber has a capacity equivalent to a two-hour supply for the boilers, so that the water is circulating very slowly at this point and time is secured to allow complete precipitation to take place. The water passes from this settling chamber through two small chambers packed with excelsior which catches the precipitated particles still suspended in the water. The water then falls by gravity into the main heater, where it is heated to a temperature of 205 deg. Fahr.

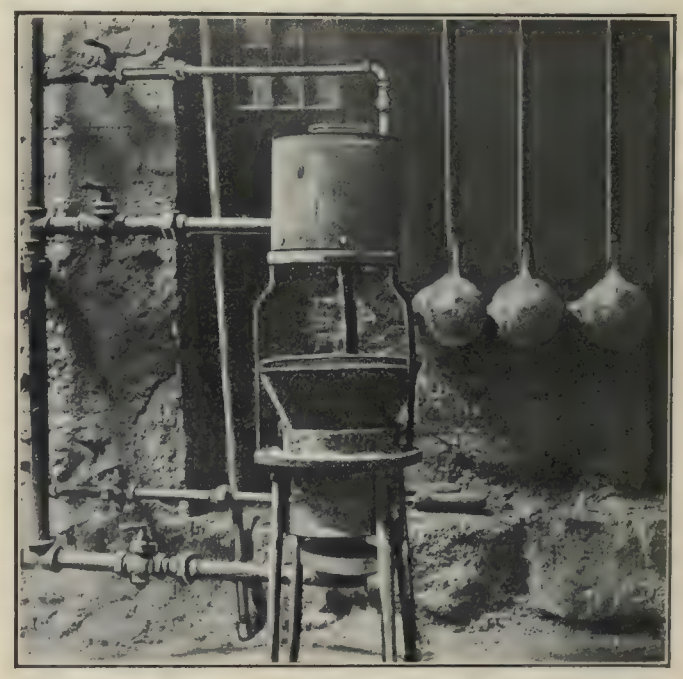
The soda ash is fed into the water as it enters the small tank pump, which pumps it into the auxiliary heater, and the lime is fed at the point where the water leaves the auxiliary heater. Both chemicals are fed by means of small pumps connected to the valve stem rocker arms of the boiler-feed pumps, so that the amount of chemicals used is proportioned to the amount of water fed into the boilers.

The work of building the treating tank, auxiliary heater and chemical pumps was done by C. O. Maxwell, chief engineer, at a cost of approximately $160. The temperature of the water entering the boilers has been raised from 170 deg. Fahr. to 205 deg. Fahr., which represents a saving of 3½ per cent in fuel. A much greater saving has been effected, due to the decreased maintenance of pumps, piping and boilers. This treatment has almost eliminated the scale formed in boilers and is costing us less than 1 cent per 1000 gal.

Bearing-Babbitting Furnace

BY J. C. DONOVAN, MASTER MECHANIC UNION ELECTRIC COMPANY, DUBUQUE, IOWA

A gas bearing-babbitting furnace which has proved particularly valuable in reducing the costs of first quality bearings is being used in the shops of the Union Electric Company, of Dubuque, Ia. As shown in the accompanying illustration, the furnace consists of two parts. The upper surrounding shield contains a cylindrical burner over which old bearings are set to melt the babbitt. The melted babbitt falls into the lower



DUBUQUE RAILWAY—BEARING-BABBITTING FURNACE

pot, which is heated by a circular gas burner. The usual method of pouring the babbitt into the bearing mold is followed.

As is also shown in the illustration, air and gas are fed through mixers to each burner, insuring a quick, hot flame. The hot flame in direct contact with the babbitt metal in the old bearing consumes all combustible foreign matter and insures that only clean babbitt falls into the melting pot below. In addition to the foregoing advantage the hot flame insures a minimum loss in babbitt through oxidation.

The Union Railway, which operates street surface cars in the Bronx, New York City, has notified the Public Service Commission for the First District that it has completed the standardization of bumpers on its cars. The improvement was made at the request of the commission after a collision on the 149th Street line in September, 1914, when some persons were injured. The seriousness of the accident was due to a difference in the height of the bumpers on each car, permitting one car to crush the dashboard of the other.

A New Type of Catenary Hanger

BY W. H. CREVISTON, ILLINOIS TRACTION SYSTEM

Recently the Illinois Traction System tested a new type of catenary trolley hanger invented by C. H. Robertson, one of the oldest motormen on this road. The claim is made that this hanger, which is shown in one of the accompanying illustrations, will catch or lock the broken ends of the trolley wire to the messenger. This prevents the rest of the hangers from sliding along the messenger, a condition which frequently results in wrenching the mast-arms from the poles or in tearing down the trolley-wire suspension. As shown in one of the illustrations, the top of the hanger is an arc with teeth which grip the messenger when the angle of the hanger is changed from the vertical. The trolley ear is pivoted to the hanger, thus when the wire breaks the hanger swings from the vertical position and brings the clamp into play. Where an ear is not pivoted to the hanger it is held in a vertical position, and a strain on the trolley wire slips the hangers along the messenger.

SAFETY TROLLEY HANGER

The halftone illustrations show a test made on one of the lines of the railway. In this test the trolley wire was cut at an ascending grade in the track so that the pull on the wire would be greater than that exerted by the weight of the wire only. Approximately ½ mile of five-point catenary construction was equipped with the new type of hangers and the trolley wire was cut between the third and fourth hangers between mast-arms. As will be noted in one of the halftone illustrations, when the ends of the trolley wire were again raised approximately to their original position, they were only about 12 in. apart. In another of the illustrations the cut wire is shown swinging, while the trolley beyond the first two hangers each side of the cut is approximately at normal position. In other words, the first hanger on each side of the break took practically all of the strain, while the second hangers beyond were found to be very little, if any, out of their normal position. Aside from the effect of the hangers retaining about their normal position on the messenger, the swinging position of the trolley wire is such as to eliminate a ground and also permits trains to operate under the break. Line repairs may also be easily made since there is no damage to the rest of the catenary construction, and the ends of the broken wire when restored to their normal position are only a short distance apart. These clinch hangers are manufactured by McConkie & Robertson of Peoria, Ill.

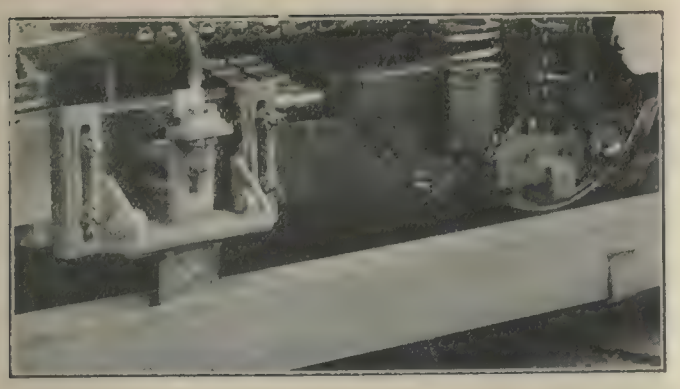
SAFETY TROLLEY HANGER—BROKEN TROLLEY WIRE HELD IN ORIGINAL POSITION

Novel Contact Rail Installation in England

There will shortly be placed in commission on the division between Manchester and Bury, Lancashire & Yorkshire Railway, a novel form of 1200-volt third-rail contact system which is the invention of the general manager of the company, J. A. F. Aspinall of Liverpool. The distance between Manchester and Bury is 9½ miles. A reference to this installation, noted on page 62 of the issue of the ELECTRIC RAILWAY JOURNAL for July 10, was made by H. M. Hobart in connection with the discussion of contact systems at the recent Deer Park convention of the American Institute of Electrical Engineers.

The essential features of the invention are clearly shown in the accompanying illustrations, the most novel

SAFETY TROLLEY HANGER—CUT TROLLEY WIRE HELD BY HANGER



NOVEL CONTACT RAIL SYSTEM—ASPINALL PROTECTED THIRD-RAIL, MANCHESTER & BURY RAILWAY

NOVEL CONTACT RAIL SYSTEM—FORM OF SHOE FOR ASPINALL PROTECTED THIRD-RAIL

ones having to do with the side bearing of the contact device upon the rail and the method of surrounding the rail with wood guards.

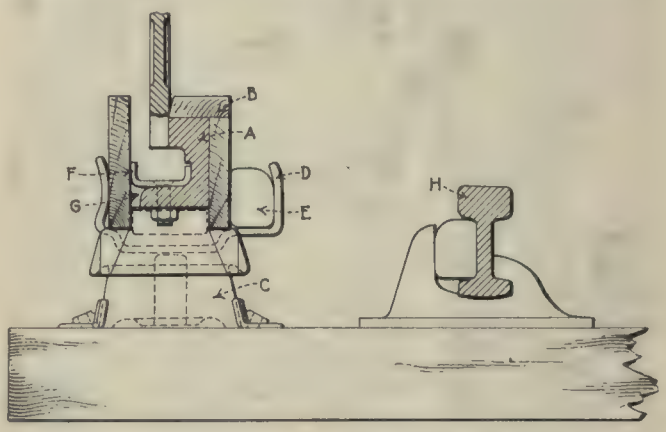
Referring to the cross-sectional view, which shows the preferred form of contact rail, it will be noted that a channel form of rail is used with a head sufficiently thick to provide a wide contact surface on the side. The form of rail was selected to provide a low center of gravity to prevent overturning even when the rail is not fastened down. While any form of rail can be used, this one is also well adapted to inclosing with protecting wood guards.

The contact rail is set upon insulators provided with lugs to prevent lateral movement. It is almost entirely inclosed with boards of Australian Karri timber which cannot be set on fire. The only openings around the rail are a slot at one side of the cover for the accommodation of the current collector, and drainage holes, as *G*, are provided to prevent accumulation of water in the groove formed between the guard and the collector rail. There is not a nail or bolt anywhere in the protecting guards.

The angle-shaped guard, *B* in the illustration, rests directly against the rail surface, but the invention covers insulation therefrom if such be found necessary. The guard on the slot side is spaced away from the rail by means of a wooden filler block, termed by Mr. Aspinall a packing or distance piece. Over the rail base is a bent metal distance piece, *F*, secured in place as shown. The guards are attached to the collector rails without bolts by means of detachable metal clamps, *D*, placed between insulators. In connection with these are used wooden keys, *E*, preferably similar to those used in fastening the running rails in their chairs. In the diagram one of the running rails is shown at *H*, with the wedge holding it in its chair. The relation of the running and conductor rails, in regard to heights and spacing, are incidentally brought out in this figure.

The contact device, which with its mounting is shown in the accompanying halftones, is hinged and is pressed against the contact rail by means of a coiled spring. The method of mounting upon an insulating support is clearly shown. The halftones also show details of the protected rail with approaches, and an unprotected fourth-rail used for the return, as in standard British practice.

The advantages of this novel construction over the usual one appear to be that very complete protection can be furnished and provision can easily be made for considerable vertical variations in the relative positions of rail and collector. Under the climatic conditions found in England difficulties with sleet ac-



NOVEL CONTACT RAIL SYSTEM—CROSS-SECTIONS OF PROTECTED THIRD-RAIL, "A," AND RUNNING RAIL, "H"

NOVEL CONTACT RAIL SYSTEM—ASPINALL PROTECTED THIRD-RAIL WITH ENTERING RAMP FOR SHOE AND THE RETURN FOURTH-RAIL CONSISTING OF A PLAIN RECTANGULAR BAR

cumulations are not anticipated. The simplicity of the construction is such that the ordinary trackman or "plate layer" can keep the contact rail in order, with the exception of the bonding.

The Lancashire & Yorkshire Railway was the earliest main line in England to be electrified. Third-rail, with 600 volts, was used on the original installation between Liverpool and Southport where a very heavy service was operated. The average distance between stops is 1.32 miles and the schedule speed 30 m.p.h. This section has been operated electrically for many years. Mr. Aspinall has long been interested in the employment of higher voltages and in 1913 put into operation an experimental 4-mile, 3500-volt, d.c. line with overhead conductor, between Bury and Holcombe Brook. The operation was satisfactory but problems connected with tunnels and bridges prevented the extension of the experimental line and the 1200-volt third-rail was selected for the present electrification. These facts are mentioned to indicate that the chosen construction was adopted after long experience with electrical operation under local conditions.

Inexpensive Drinking-Fountain Guard

In the new shop of the Holyoke (Mass.) Street Railway a sanitary drinking fountain is located in the repair shop between doors leading into the stockroom and the forge department. To guard the "bubbler" from injury in the handling of material, two ⅜-in. x 2-in. straps of wrought iron have been installed, as shown in the accompanying illustration. The straps are 6½ in. apart on centers, which gives ample room for manipulating the spring valve controlling the fountain. They are bolted through the shop wall and protect the piping as well as the fountain, besides safeguarding the clothing of the men passing through the busy aisle in which the fountain is located.

DRINKING FOUNTAIN GUARD AT HOLYOKE (MASS.) STREET RAILWAY SHOPS

Paste Filler for Commutator Slots

Commutator life on the lines of the Indianapolis & Cincinnati Traction Company has been materially increased by applying an insulating-paste filler in the commutator slots of the single-phase motors the company uses. Before a motor is returned to service and after it has undergone repairs the grooves between the commutator segments made by the slotting machine are filled with a mixture of dental plaster of paris and hard-cooked starch in parts one-half each by weight. This is made into a paste by adding gum shellac and stirring to a uniform consistency, after which it is spread over the commutator bars, particular attention being given to fill the slots. Experience of the last four years has shown that this paste filler prevents carbon and copper dust from collecting in the slots. The paste is a fair insulator, hence eliminates the destruction of the edges of the commutator bars caused by arcing, a condition which occurs after a motor has long been in service and copper dust has collected in the slots.

Improvements in Des Moines Interurban Cars

Recent improvement in the cars of the Inter-Urban Railway Company of Des Moines, Iowa, have done much to eliminate difficulties experienced in the past. Perhaps the most important of these, made principally for the comfort of patrons, is the provision of a separate baggage compartment. In the past the baggage and express was loaded in the smoking compartment. When baggage shipments were heavy this entailed discomfort to the passengers, and at the same time the baggage and express matter was under the control of no one. This was also true of mail bags which were transported in this compartment. When the full capacity of the baggage compartment was not required, folding seats which were placed along the sides of the car were lowered for the use of passengers. When baggage and express haulage was heavy these seats were not available and passengers were required to stand or to use the baggage for seats.

VIEW OF DES MOINES INTERURBAN CAR, SHOWING AIR-OPERATED LOCOMOTIVE BELL

The Inter-Urban Railway passenger cars are 54 ft. 5 in. in length. A space 23 ft. 9 in. long serves as the main passenger compartment, and on the original cars the baggage and smoking compartment was 13 ft. 10 in. long. In the remodeled car the main compartment has been maintained at approximately the same length, while 8 ft. ½ in. has been allotted to the baggage and 8 ft. 2 in. to the smoking compartment. The extra length was obtained by eliminating the motorman's compartment, the front end of the car serving as a cab as well as a baggage compartment. By this arrangement baggage, express matter and mail is put under the control of the motorman.

The electrical equipment of these cars includes GE-73-C motors with a 2.12 to 1 gear ratio obtained by

using a twenty-four-tooth pinion and a fifty-one-tooth gear. These motors are rated at 55 m.p.h. at 600 volts and they are controlled through GE Type M control. To make the removal of dust which collected on the reversers and contactors of this equipment an easy task, they were varnished with a mixture of orange shellac and oxalic acid. This provided a smooth, hard surface which was much more easily cleaned than the bare metal.

During the Iowa winters considerable trouble has been experienced with snow collecting in the contactor boxes. This was obviated by providing an asbestos-board bottom in the boxes with an opening across the end away from the motorman's position. This arrangement permitted the snow which collected in the contact boxes to be drawn from them by the air suction created when the car was in motion.

A setting and tripping switch in the motormen's cabs has been substituted for the relay. This has been found to be a more dependable device and furnishes better protection to the motors. Solid fingers on the reversers have been replaced by split fingers and more satisfactory results have been obtained. Also, a piece of fiber inserted between the forward and reverse segments has been found advantageous because it permits the fingers to slide more easily when the reverser is being used.

The laws of Iowa provide that a bell must be sounded continuously whenever a train passes a highway crossing. To conform to this meant to place a burden on the motorman, which this company believed diverted his attention from his other duties. In order to relieve him, all cars have been provided with air-operated standard locomotive bells. As shown in the accompanying illustration, these bells are mounted above the motorman's cab, and they weigh, complete with air ringer, approximately 29 lb. A rather interesting feature in connection with the bells is the use of windshields in front of them. This was found necessary to reduce the air pressure required to ring the bell, and it has also been found that the shield tends to diffuse the sound to better advantage.

Rear Wheel Fenders for New York Buses

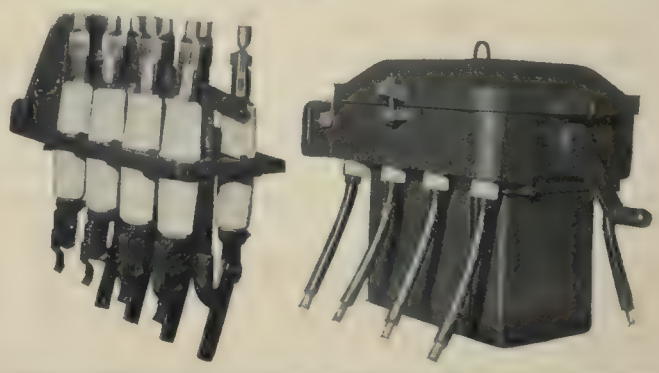
Long wooden safety fenders have been hung beneath the bodies of all motor buses operated by the Fifth Avenue Coach Company, New York City. These are located on either side of the buses, between the front and rear wheels, and curve outward toward the rear, so that rear wheels of each vehicle are thoroughly protected. Oddly enough, the majority of accidents to pedestrians in the streets of both New York and London on account of the motor bus have been rear-wheel accidents. People have a way of waiting for the front wheels of the bus to pass them and then heedlessly walking into the path of the rear wheels. In New York all classes of bus accidents are surprisingly few, the record last year being on the basis of one pedestrian injured to more than 1,500,000 miles of service. This excellent showing is largely due to the fact that the company is exceedingly careful in the selection and training of its chauffeurs, so that avoidable accidents to pedestrians have been almost wholly eliminated. With the installation of the fenders it is believed that mishaps to persons in the streets will be practically a thing of the past. These fenders, it may be said, were provided on the company's own initiative, its safety record having been such that its equipment has never been unfavorably criticised by the public authorities. The new fender is of the same type as that recently adopted by the London bus company with successful results.

Oil Knife Switches

An extensive line of oil switches for voltages up to 7500 has recently been brought out by the Westinghouse Electric & Manufacturing Company. These are non-automatic and are suited for a wide range of application, being made for indoor service in switchboard-mounting, direct wall-mounting, and remote-control styles, and for outdoor service on poles or in subway.

The direct wall-mounting style is particularly adaptable to motor installations on account of the facility with which it may be mounted on any support convenient to the motor operator. The lever and handle extend outward over the oil tank so that the switch may readily be mounted against a wall, post or other vertical support. The remote-control wall or pipe-mounting style allows the switch to be mounted at a convenient point away from the switchboard and operated from the switchboard or other point.

The outdoor oil switch is particularly adapted for controlling lines entering buildings, branch feeders from the main lines, sectionalizing feeders, or any of the numerous purposes for which an outdoor type of switch



INDOOR TYPE OF OIL KNIFE SWITCH WITH TANK REMOVED, AND OUTDOOR SWITCH FOR POLE MOUNTING

may be utilized on distribution systems. The subway-type oil switch is for mounting in places where a switch may be required to be operated submerged. It is made with two, three or four poles, and either single or double throw, and is designed for voltages up to 4500 and capacities up to 200 amp.

Characteristic features of this type of switch are: Knife-blade contacts submerged in oil; live parts carried on insulating supports, affording a high quality of permanent insulation between adjacent poles and between the frame and live parts; small space required for mounting; accessibility of parts for purpose of inspection and repair; inclosure of all live metal parts, and low first cost. Knife-blade contacts are used because they insure the best contact for low temperature rise in a non-automatic switch. Each contact jaw has attached to it an arcing piece which takes the final break, thus preventing any burning of jaws. These arcing pieces are inexpensive and readily replaced when worn or burnt away.

With the exception of the 1500-volt switches, the contacts are mounted on all-porcelain insulation. In switches for 7500 volts and above the insulation is of the pillar porcelain type, similar to that of the best accepted standard form of circuit-breaker construction. In the 4500-volt type up to 200 amp. the contacts are mounted on a sturdy horizontal porcelain base, with molded porcelain barriers between all live parts. In general this form of construction gives these switches the same characteristics ordinarily looked for only in the highest grades of oil circuit-breaker construction, but these are obtained at a more moderate price than could apply to the non-automatic form of oil circuit-breaker.

Prepayment Car Apparatus

Since the United States Circuit Court of Appeals for the Second Circuit rendered an adverse decision on certain patents of the Prepayment Car Sales Company and the Supreme Court of the United States declined to review this decision, there has been considerable interest about the future plans of the company. An announcement on this point has now been made by Thomas W. Casey, president of the Prepayment Car Sales Company. According to Mr. Casey, while this decision was unfavorable, it was on two patents only and in one district only. The company believes these patents still valid, and it is expecting to have them adjudicated in other districts.

The Prepayment Car Sales Company will make certain changes in its organization, and in future will devote itself to the patent features of its business only, and after Sept. 1 the manufacture and sale of door and step operating mechanism will be carried on by the National Pneumatic Company.

The company's business began, of course, with the development of the "pay-as-you-enter" car in Montreal some ten years ago. The idea was introduced in the United States shortly after. At first it met with considerable opposition but soon proved very popular. Later, other patents were secured, notably those of the Pay-Within Car Company and rights for prepayment cars under the door and step mechanism patents of the National Pneumatic Company. During late years, therefore, the company's business has consisted in the issue of licenses to use its basic patents covering the location arranged for the conductor in relation to the entry and exit of passengers and also in the sale of mechanism for controlling the operation of the doors and steps, etc.

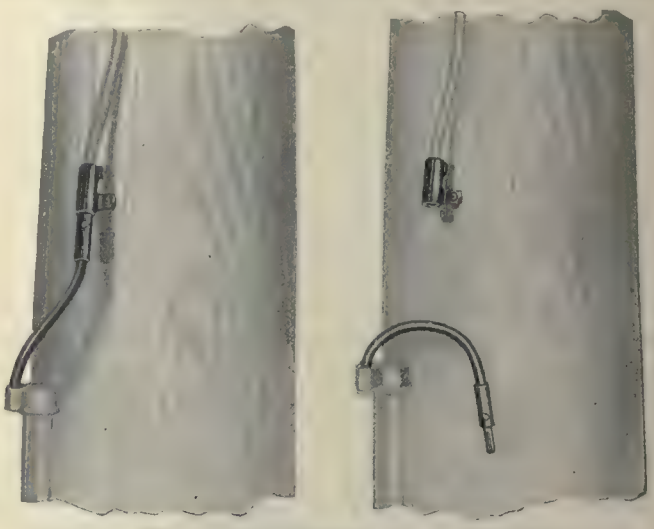
According to Mr. Casey, the only patents so far litigated have been those covering the location arranged for the conductor in relation to the entry and exit of passengers. The many advantages of the prepayment car have been evidenced by its almost universal adoption in one form or another, and while many companies feel that the electric railway industry owes a heavy debt to those who originated and introduced the idea, whether the basic patents will stand all the tests of legal validity or not, in justice to all, it will be the policy of the company not to accept royalties under these patents on any cars hereinafter put in service until the basic patents have been finally declared valid. In the meantime the mechanism, which has heretofore been manufactured for the Prepayment Car Sales Company by the National Pneumatic Company will be sold direct by the National Pneumatic Company for prepayment cars of all types, just as that company has sold mechanism in the past for elevated, subway and interurban cars. While the company has no right to guarantee against the basic prepayment patents which are still owned by the Prepayment Car Sales Company, its customers will be on the same basis, so far as this fact is concerned, as customers of competitors.

The National Pneumatic Company is well known as manufacturer of pneumatic door devices used so largely on subway, elevated and interurban railways, as well as manual door and step operating mechanism for electric railway cars, and it is said that the company is in a position to continue this work on a very large scale. The development of the prepayment car opened a new field for door mechanisms, and these will now be available on the conditions already described.

To carry out the new plan, which will be put in effect on Sept. 1, Mr. Casey will be elected a director and also vice-president and manager of sales of the National Pneumatic Company. Harold Rowntree will continue as president of the company and P. R. Forman as general manager and engineer.

Ground-Wire Disconnector

A new ground-wire disconnector is being manufactured by the Electric Service Supplies Company, Philadelphia, Pa., which eliminates the element of danger to linemen involved by grounded connections on a pole line. It is well known that lightning disturbances, owing to their relatively high frequency, will not travel far along a line in order to reach a lightning arrester and so be dissipated to earth. It is, therefore, self-evident that in order to afford maximum protection to apparatus lightning arresters should be installed as close to the apparatus as possible. This has been advocated for years. With transformers it is usually done by installing arresters to protect every transformer, or to protect every transformer whose capacity is above a certain minimum, arresters being installed on the transformer pole and grounded at this pole. In such cases the ground wire presents an element of danger for a lineman, who must, for example, climb the pole on a wet night to replace a blown transformer fuse, because he may accidentally cross himself with the lightning-arrester ground wire and with a live wire or live piece of apparatus.



GROUND-WIRE DISCONNECTOR IN CONNECTED AND DISCONNECTED POSITIONS

To avoid this danger the Garton-Daniels ground-wire disconnector has been designed. It consists of a brass casting that is screwed to the side of the pole. At the top a lug is provided into which a No. 4 or No. 6 solid wire running from the lightning arrester may be soldered. At the bottom another lug is provided into which a split brass plug slides. This plug is furnished with 12 in. of No. 6 flexible copper cable, the free end being soldered into a standard brass cap screwed to the end of the lightning-arrester ground pipe. With this method the ground pipe, as shown, is usually extended 8 ft. or 10 ft. up the pole to prevent the plug being withdrawn by any unauthorized person. A lineman who desires to work on the pole top for any reason simply pulls out the plug as he ascends, thereby disconnecting the upper wire and lightning arresters from ground, and so rendering work on the pole comparatively safe.

These ground-wire disconnectors are very useful where lightning arresters are tested by connecting them between opposite phase wires. The pulling of the plug disconnects the ground terminals of the arrester from earth, making unnecessary the removal of the ground wire from the ground binding post to prevent momentarily grounding one phase of the system while making the test.

News of Electric Railways

WILKES-BARRE ARBITRATORS REPORT FINDING

Employees Receive Increase of 9½ Per Cent—Sliding Scale Based on Profit Sharing Adopted for Two Years

The Wilkes-Barre board of arbitrators, Samuel D. Warriner for the Wilkes-Barre (Pa.) Railway, Thomas D. Shea for the Street Car Men's Union, and Dr. John Price Jackson of the State Department of Labor, as umpire, made public its findings on July 10. The previous history of this case was published in the ELECTRIC RAILWAY JOURNAL of April 10. Under the award the men have secured an increase in wages of about 9.5 per cent and a sliding scale based on a profit-sharing plan during the fiscal years of 1916 and 1917. If, instead of resorting to a strike last April to enforce impossible demands, the men had accepted the compromise offer of 26 cents per hour, they could have avoided the loss of nine days' work, besides the loss of revenue to the company and the inconvenience experienced by the general public. The award seems clearly to establish the fact that the claims of the company were fully sustained by the majority of the arbitration board.

The wages to be paid for a period of the three years beginning with Jan. 1, 1915, to motormen and conductors, in lieu of the present flat rate of 24 cents per hour, are to be: First-year men, 24 cents per hour; second-year men, 25 cents per hour; third-year men, 26 cents per hour; fourth-year men, 26½ cents per hour, and fifth-year men, 26¾ cents per hour. Moreover, the motormen and conductors are to participate in the increased passenger revenue received by the Wilkes-Barre Railway per car-hour in 1916 and 1917 in the following manner: The passenger revenue per car-hour for the fiscal year ended Dec. 31, 1914, which was $2.78, is to be the basis. For each 2½ cents of passenger revenue per car-hour in excess of this basis received by the company during the current fiscal year, each motorman and conductor shall receive an additional compensation of one-fourth of 1 cent per hour for his services during the next fiscal year.

The arbitrators state that the wages paid to trolley employees in the region adjacent to Wilkes-Barre show many conflicting discrepancies. An effort was made to adjust the wages of the Wilkes-Barre Railway employees in such a manner as to take into consideration the averages of the wages paid to employees of other companies of the same class and operating under the same conditions, and to award a reasonable increase over and above these averages. The testimony regarding the increase in living conditions was of so conflicting a nature as to be of little value, but it is felt the proportional increase awarded fairly not only represents comparative conditions of labor, but also gives weight to the increased cost of living reasonably to be expected during the period of the present contract.

RAILROADS FILE MAIL PAY CLAIMS

New England Roads Seek to Recover from Government Large Losses Caused by Acts of Postal Department

Alleging that they have lost large sums through carrying the mails under the present system of weights and that their compensation at the present rate fixed per mile is unreasonable, unjust and confiscatory and hence unconstitutional and void, seven New England roads filed printed petitions on July 17 in the Court of Claims in Washington in an effort to obtain from the government the sums of money which they contend they have lost in the last six years by reason of the postmaster-general's alleged arbitrary mandates and the operation of the present system.

The roads filing these petitions and the amounts claimed from the government are as follows: New York, New Haven & Hartford, $4,524,713; Boston & Maine, $3,676,823; Maine Central, $1,839,740; Bangor & Aroostook, $490,194; New York, Ontario & Western, $305,000; Sandy River & Rangeley Lakes, $30,968, and Bridgeton & Saco River, $13,425; total, $10,880,865. This is an average annual loss of $1,813,477 for the last six years.

The petitions filed by these New England railroads claim: (1) That the annual increase of mail has not been paid for at all; (2) that the carrying of the parcel post has been without adequate compensation, and (3) that the deficiency created by loss of mail compensation must be made up from the freight, passenger and express receipts. Two causes of action are set up in the petitions filed, one with respect to the system of quadrennial weighing, declared to be illegal, and the other with respect to the rate of pay per mile and the increasingly expensive demands made from time to time by the postmaster-general upon the railroads for facilities, for which no adequate compensation has been made.

With respect to the weighing of the mails every four years as a basis for the mail payments to them, the railroads assert that such weighing has been done exclusively by the post-office department and that they have been prohibited from fully inspecting and verifying such weighing. They repeatedly requested and demanded of the postmaster-general that the mails carried be weighed annually or that the weights be taken at the beginning and end of the four-year period and averaged, but such demands were "ignored and refused." With regard to the effect of the parcel post law on them, these railroads point out that the increased mail resulting from these packages has not been included in any weights ascertained by the department and no compensation has been paid them for it upon any basis of weight. Regarding the acts of the postmaster-general by which they allege that their burdens have been increased, the railroads allege that he has from time to time during the existence of outstanding quadrennial contracts made large additions thereto and increased requirements therein; he has made greater and more expensive demands for rooms and equipment for handling the mails and carrying them to post-offices, and he has made other illegal and onerous exactions.

SAFETY CONDITIONS IN BOSTON SUBWAYS

An Interesting Report Just Rendered to the Public Service Commission by William L. Puffer

In accordance with a vote of the Massachusetts Public Service Commission resulting from the accident to the electrical distribution system of the New York subway on Jan. 6, 1915, an investigation of the conditions of safety on the subway and rapid transit lines of the Boston Elevated Railway has been completed by William L. Puffer, consulting engineer, Boston, who has addressed an extended report to the board on the subject.

At the outset of his report the author states that early in his investigation he was informed by M. C. Brush, second vice-president, that a conference of officials was held immediately after the New York accident as to the possibility of a similar accident in the Boston subways and tunnels. As a result of the studies then made and also of certain suggestions made by Mr. Puffer during his examination a number of the recommendations in his report have been adopted and others are under advisement. In acknowledging this, Mr. Puffer says: "A report of this kind must necessarily appear critical and perhaps unfriendly because it cannot go into all details of the good things so self-evident in the service and equipment which continuously and safely transports thousands of passengers." After contrasting the conditions in New York and Boston, the report points out that in the latter city the liability of the system to derangement is diminished by the radial character of the service, the shorter distance between stations, and the fact that there are several power houses feeding energy toward the city from different directions, and generally over more than one route.

Regular inspections bearing upon the prompt elimination of combustible materials and rubbish are recommended, with the storage of such combustibles as may be absolutely necessary for operation at stated places where thorough automatic fire protection can be had. All permanent

construction should be fireproof, and combustible rubbish from construction or repair work removed at once.

The author commends the block signal installations in the Cambridge and Boylston Street subways and states that that of the Washington Street tunnel, while not the equal of the two former, was fully up to date at the time of its installation and able to give a fair degree of safety. The automatic train stop is used in these tunnels and is desirable. In place of the simple home signals used in the East Boston tunnel, Mr. Puffer recommends the installation of a system similar to that in the Boylston Street subway, extending through all stations from portal to portal. The report states that all of the apparatus relating to signals and train stops on the rapid transit lines appears to be of the best kind, well installed and carefully maintained.

The report recommends the reconstruction of the lighting distribution center at Boylston Street, in the Tremont Street subway, which contains three large transformers for the supply of emergency lighting in a large portion of the subways and tunnels of the city, the transformers being placed in an air-tight fireproof room with the exception of an outdoor smoke vent. Transformer oil drains and the inclosing of all high-voltage circuits in ducts are advised, with abandonment of the chamber as a workroom and storeroom, and the removal of all combustibles to a special room provided with automatic sprinklers or otherwise protected against fire.

The report recommends that efforts be made to devise a scheme whereby the third-rail can be provided with a suitable insulating and protecting cover. The author holds that the location of the bare third-rail about 19 in. to one side of and 6 in. above the running rail constitutes a dangerous obstruction in case of a hurried exit of a carload of passengers from a train, even assuming the tunnel lights were of full brilliancy. Experience at New York with the covered third-rail is cited as proof of its success, although the author realizes the difficulties of designing a covering and contact shoe suitable for all engineering and operating requirements. He believes it possible to lower the third-rail 2 in. and set it about 3 in. farther away from the running rail. Then the present walks if raised a few inches would become a very efficient cover for the rail and at the same time serve as a walkway. Should it be found too costly to provide a covering for the third-rail, the report recommends that all woodwork in the floors of all cars to be operated by third-rail power be replaced with non-combustible materials until such time as all-metal cars can be used. It also recommends that all third-rail section switches not now situated at stations be provided with remote-control from the same point or points where the switches are located for the sections adjacent to the stations.

In connection with the other conductors, the report emphasizes the undesirability of grouping lead-covered cables, on account of the susceptibility of such coverings to melting at relatively low temperature in case of breakdown. Such breakdowns are not serious when they occur in a properly constructed duct line, but are serious as well as more liable in manholes where the unprotected cables may be injured when resting on sharp corners, or by careless handling. In future installations it is desirable that no power cables be placed in subways other than actual connections to third-rails, trolley wires and switches, but much can be done in the way of prevention, such as separation of the different types of service by considerable distances, much greater use of concrete or earthen barriers, better protection and support where there is a change of level of cables, removal of pipes or other conductors from the vicinity of cables. The mechanical protection of all splices and exposed cables by wrappings and split tiles is recommended. It also favors a separation of ground return cables from feeders and highly commends the practice of the Boston company in making but slight cross-connections between the lead sheathings. Small rubber-covered wires used in signal, lighting and telephone service need classified separation for service continuity, but are not factors that are to be considered of moment in relation to safety.

The continuous use of the ventilating fans originally installed for subway service at Boston has been found unnecessary, except in the East Boston tunnel, which passes beneath Boston Harbor. The report recommends the reversal of the direction of air flow in the latter tunnel so that air will be forced in emergencies from stalled cars toward the stations, and the provision of remote-control for fan motors. Distant control from one or more points on each side of the fan and a reserve source of power are advised.

The frequent installation of telephone stations with blue-light markers and duplicate circuits placed near the subway roofs is also advised, the lamps to burn constantly. The report also recommends the clearer marking of exits and the use of fastenings at the gratings and doors of emergency exits which can be opened without any special skill, knowledge or strength. The present provision for emergency lighting of subways and tunnels is commended, but it is suggested that some of the older installations can be improved, both as to the location of lighting cables and safety from interruption by accidents. Two red tail lights are recommended for all cars and trains entering subways, with the exception of certain short loops. Special oil or storage-battery lighting in the cars has been carefully considered, but where the distances are so short seem unnecessary, provided the emergency lights and the blue-light markers are intelligently planned and installed. The clearer indication of the location of fire protection apparatus is favored, with the use of entirely fireproof car construction in the East Boston tunnel and in all new rolling stock equipment for tunnel service, with the provision of non-combustible flooring for wooden or partly wooden cars in the Washington Street tunnel, together with the use of automatic stops in the East Boston tunnel and other minor improvements.

BOARD REPORTS ON GRADE CROSSINGS

Interurban Line in Los Angeles Should Elevate or Depress Tracks—City Line Should Use Viaducts or Subways in Business Districts

The Board of Public Utilities of Los Angeles, Cal., has issued a report dealing with grade crossing elimination, transportation and congestion. The report concludes that the problem as it concerns electric carriers is brought down to this: (1) Interurban railway to be elevated or depressed, as the particular locality requires, and to be removed from the street surface, such elevated or depressed tracks to lead to suitable terminals or to a loop subway with no terminal; (2) viaducts at all principal thoroughfares across the industrial district to accommodate vehicles and street cars, and (3) street railways to use viaducts across the industrial district, subways through the congested retail district and rerouting. The conditions necessitating such expenditures are said to be not chargeable to any one party and the costs should be distributed among the interests affected.

In regard to the interurban system of the Pacific Electric Railway, the report states that as long as the company is occupying the city streets, it would seem that the public right for such use could, on demand, require that all cars should accept local passengers and stop at all intersecting streets in order to provide for the fullest accommodation of the local public.

Continuing, it says: "This would inconvenience and seriously interfere with the interurban traffic for which this road is primarily designed. The province of the interurban lines is to connect the interurban population and freight with the city. Cars of 35 to 40 tons, geared for high speed, cannot be operated economically or safely on the surface of the streets, calling for stops at every corner; they should reach the city limits in the shortest space of time and with as few stops as possible. This can never be accomplished while interurban lines occupy the surface of the city streets, alone or jointly with the local city lines, at least in the congested parts of the city. They should be required to elevate or depress all lines, above or below the street surface, throughout the congested district, with liberal allowance for increase in the area of this district, or, better still, to the city limits; or to use a private right-of-way involving few grade crossings of streets or other

railroads. There are no serious difficulties presented as to physical construction, and the money saved in the operation of these cars through the congested district, the economy in operation and maintenance—especially in the renewals to the surface of streets, cheaper roadbed construction and freedom from accidents due to surface conditions—would pay a fair rental and interest on the cost of construction."

Many of the troubles of the local Los Angeles Railway are said to be due to the blocking and congestion of traffic by the interurban cars in the congested district and to the numerous railroad crossings that have to be flagged. It is believed that studies now under way for rerouting and subways would solve the remaining congestion.

MINNEAPOLIS LINE WANTS NEW FRANCHISE

Street Railway Takes Initiative—Asks for Valuation and Proposes Transportation at Cost

On June 8 C. G. Goodrich, president Minneapolis (Minn.) Street Railway, addressed a letter to the City Council of Minneapolis asking that steps be taken for the renewal of its franchise, which still has eight years to run. The request was referred to the special committee on street railway matters, which was instructed to negotiate with the railway for the purpose of drawing up a franchise ordinance to be submitted to the people.

The committee met on July 14 for its first formal session, at which time a letter was submitted from Mr. Goodrich briefly outlining the franchise features which he deemed fundamental. In general outline the plan closely resembles the one which has been in operation in Cleveland for four years and is known as the "transportation at cost" plan. Though not worked out in detail, the suggested plan contemplates: 1. A fair valuation upon the company's property. 2. Assurance of a fair and reasonable return to the company upon this valuation. 3. The turning over to the city of the net surplus earnings after this charge has been taken out; the city's portion to be used, after it has sufficiently accumulated, in the reduction of fares or for other transportation purposes as the city may determine.

The plan also embodied the following statements relative to purchase, improvements and depreciation:

"The enabling act which was passed by the last Legislature permits the city to enter into an agreement that will give it the right to purchase at the end of any five or ten-year period. This company has no objection to giving the city this right to purchase at any time upon reasonable notice and on a fair basis to be agreed upon.

"At the present time there is a strong demand for the building of new lines and the extension of old lines to keep pace with the city's growth. Such new lines and extensions will require additional cars and power-house equipment, and this demand will continue naturally every year. The money expended for such necessary improvements can be added to the value agreed upon.

"Funds should be set aside for depreciation and renewals, as this is as much to the interest of the city as it is to the company, for the highest state of efficiency can only be obtained by maintaining the property in the best possible physical condition."

RHODE ISLAND MEN TO ARBITRATE

The strike inaugurated at midnight on July 14 by the Street Car Men's Union against the Rhode Island Company, Providence, R. I., when the officers of the latter corporation refused to accept as arbitrators three men named by the union, was ended at 1.15 a. m. on July 17, when an arbitration agreement was signed by both parties to the controversy and the men were ordered back to work. All the cars were in operation on the morning of July 17 after the two-day tie-up of practically all service in Rhode Island.

On July 15 Mayor Gainer offered his services to both parties in an endeavor to bring them together in the matter of arbitrators. After a series of conferences with the Mayor the union men withdrew their ultimatum regarding arbitrators, and, adopting as their own the proposal made by the trustees of the Rhode Island Company on July 14, suggested that the board of arbitration be made up of one man appointed by the union, one man appointed by the Rhode Island Company, and Mayor Gainer, who should be the chairman.

On July 20 the board of arbitration was agreed upon as follows: Mayor Gainer, chairman; Michael J. Houlihan, representative for the company, and Henry T. Baldwin, representative for the union. Public hearings will begin on July 26. When all evidence is in, the board must report within thirty days.

The questions to be arbitrated are the rate of wages to be paid by the company to all members of the association and the determination of the number of hours, if any, to be guaranteed extra men for a minimum day's work. It is specifically provided in the agreement that the arbitrators shall have no right to fix any scale of wages made conditional upon any co-operative plan or upon any plan based upon future earnings of the company, and that the wage scale, as fixed by the board, shall date back and become effective as of June 1, 1915.

The board of directors of the company met on July 17 and passed a resolution approving the action of President A. E. Potter during the events leading up to the declaration and the ending of the strike.

ELECTROLYSIS TESTS IN LORAIN, OHIO

The suit of the Cleveland, Southwestern & Columbus Railway against the city of Lorain, Ohio, filed some time ago in Common Pleas Court at Elyria to prevent the enforcement of an electrolysis ordinance passed by the City Council, was recently withdrawn, since extensive tests showed that its road was now being operated well within the ordinance requirements. When the ordinance was passed it seemed likely that changes entailing the expenditure of a large amount of money would be necessary to put the equipment in shape to comply with all the requirements. Later the company concluded that such changes as were shown to be necessary would result in a saving to itself as well as a benefit to the city. The changes were, therefore, made, and the real outlay proved to be comparatively small in the end.

The tests, covering a period from April 19 to April 27, 1915, were made by A. P. Lewis, representing the Cleveland, Southwestern & Columbus Railway; Albert F. Ganz of Stevens Institute of Technology, representing the Logan Natural Gas & Fuel Company; Samuel S. Wyer, consulting engineer of Columbus, Ohio; Elam Miller and H. S. Warren, New York, representing the American Telephone & Telegraph Company, and E. S. True, Chicago, representing the general group of Bell Telephone Companies. Mr. Herrick represented the Lake Shore Electric Railway in the tests and E. W. Moore, F. W. Coen and Mr. Herrick were present at a number of the conferences. The interests indicated above joined in making the tests.

The ordinance requires among other things that all metallic conductors forming parts of current-carrying circuits be insulated from the ground wherever it was practical to so insulate them; that the average potential difference during any ten consecutive minutes between any two points 1000 ft. apart on such metallic conductors should not exceed 1 volt, and that the average potential difference between any two points more than 1000 ft. apart should not exceed 7 volts; that insulated potential wires be installed from an adequate number of points on the insulated metallic conductors, together with voltmeters, so arranged that the potential differences between these points on the metallic conductors could be readily and accurately measured. Very careful tests were made with respect to these points and the voltage drop of the tracks was noted for various distances on all the lines in the city. The data were all gathered in a report that was submitted to the interested parties.

NEW FRANCHISE GRANTED IN CLEVELAND

The franchise granted the Cleveland & Youngstown Railroad by the city of Cleveland last week provides specifically for the entrance of any interurban railways whose tracks may be crossed by the tracks of the new company. It is understood that this means that any interurban road that desires access to the central part of the city by means of its tracks may build to it for that purpose. The company

is required to co-operate with such roads in every way possible when they wish to use its tracks for this purpose, or make any change that may be found necessary. It is said to be the purpose of the company to provide a double track to be operated at high speed for the accommodation of the interurban lines. If terms for this service cannot be agreed upon between the interested companies it is provided that the matter shall be submitted to a board of arbitration.

The city reserves the right to use a strip of land approximately 50 ft. wide at the present location of East Twenty-third Street for a subway for street railway traffic, but the company may build over it and use it as may be necessary for its own benefit above the point required by this reservation.

It is the intention of the company to build a joint steam and interurban passenger station at a point near the business district where land has already been acquired for the purpose, but the amended franchise passed has little to say about this. In fact the greater part of it applies to the freight terminal, over which there was rather bitter contention.

The Citizens' Referendum League, an organization recently formed, is preparing petitions for a referendum vote on both this franchise and the one granted at the same time to the Cleveland, Akron & Canton Terminal Railroad, which is planning to build a four-track electrically operated freight subway under East Fifty-fifth Street from the lake to the southern city limits. Friends of the referendum movement claim both companies have been allowed too much liberty in the franchises and that the city has failed to provide for proper supervision of operation, especially as respects the Cleveland, Akron & Canton Terminal Railroad. They also oppose the franchise to the Cleveland & Youngstown Railroad on the ground that it is closing too many streets where its freight terminal is to be established.

COURT REFUSES TRANSIT DELAY

Judge Sulzberger on July 17, after a hearing in Common Pleas Court, refused an injunction asked by David E. Dallam, a real estate dealer, to restrain the city of Philadelphia from issuing bonds for $6,000,000 authorized for the Broad Street subway and Frankford elevated systems. The court, however, issued a cautionary order holding the litigation *in statu quo* until after a decision of the State Public Service Commission, which will hold a special meeting on the project at Harrisburg on July 26.

City Solicitor Ryan said no actual work would be commenced under Director Taylor's plans until a decision was obtained from the commission. Judge Sulzberger, however, ruled that the Department of Transit may proceed with its advertisement for bids, Mr. Ryan asking that these preliminaries be not interfered with, as such a condition would deter bidders and tend to raise prices because of a suggestion of uncertainty.

As the preliminary step incident to the construction of the Broad Street subway, Director Taylor on July 14 awarded the contract for the building of a sewer under Buttonwood Street, between Thirteenth and Broad Streets. The work is to begin on Aug. 4 and must be completed in two months. The building of the sewer was said to be in no way affected by the taxpayer's bill in equity attacking the legality of the $6,000,000 loan. Separate proceedings would be necessary to stop the construction of the sewer.

TOLEDO FRANCHISE CONFERENCE CONTINUED

In the discussion of the proposed Toledo Railways & Light Company franchise at Toledo, Ohio, Henry L. Doherty, chairman of the board of directors, told the special franchise committee of the City Council on July 16 that the two points in the present draft which will make it difficult to secure funds for improvements, are the time for making a valuation and the requirement that the company accept bonds as part payment for the property. He said that conditions are bad at this time and he doubted whether it would be possible to raise $2,000,000 for that purpose under the conditions proposed in the franchise. When questioned for his reason for objecting to the acceptance of bonds in part payment for the property, Mr. Doherty suggested that the committee consult with some of the local brokers for a reply. He proposed that the clause giving the city an option to purchase the property be eliminated from the draft altogether. Members of the committee agreed to consider this. Mr. Doherty said further that he could not see how the company could be termed a "going concern" unless some value is placed on the franchise. The committee objects to allowing anything for the franchise in case the city decides to purchase the property.

At a conference on the day previous clauses in which changes are to be made were discussed and in some cases agreements were reached. Mr. Doherty insisted that the question of valuation of the property should be settled before going any further, but some of the members argued that this should be among the last things to be considered. Mr. Doherty objected to extending the 3-cent fare privilege which is now allowed for the benefit of workers. Member Dotson conceded the point that the city should make good any losses the company might suffer from an unreasonably low fare during the try-out periods. Mr. Doherty then suggested that these periods should not be too long, as the company might be bankrupted before their termination, when a settlement with the city could be made.

OLD ALBANY CONTRACT RENEWED

On July 20 C. F. Hewitt, general manager United Traction Company, Albany, N. Y., renewed the old working and wage agreement with the employees, under the same terms as to working conditions and wages, for a period of one year from July 1, 1915.

The demand of the United Traction Company employees that they receive the runs of the members of the Brotherhood of Locomotive Engineers operating Hudson Valley Railway cars over United Traction Company's rails between Waterford and Troy, N. Y., has been deferred until after the annual convention of the Amalgamated Association to be held in Rochester, N. Y., commencing on Sept. 13. At this time it is expected that the convention will appoint a committee to confer with a committee from the Brotherhood of Locomotive Engineers to adjust the situation satisfactorily between the two unions and relieve the United Traction Company of responsibility in the matter.

The settlement of the matter in this manner is considered a complete victory for the company, as it won all of the points at issue in the recent controversy.

NO CONSENTS NEEDED IN CLEVELAND

According to a decision of the Ohio Supreme Court, rendered on July 20, the Cleveland (Ohio) Railway may now build tracks on any street in Cleveland on which Council may authorize it to do so, without the consents of owners of abutting property. Under this decision the provision of the city's new charter, conferring this power on the City Council, supersedes the State law as far as Cleveland is concerned, although it does not change matters in cities and towns which have no charters or whose charters do not contain this provision. This was the case of Charles F. Brush and others against the city and the Cleveland Railway to prevent the invasion of a section of Euclid Avenue, locally known as "Millionaires' Row." The case of residents of Reading Road, Cincinnati, against the city of Cincinnati and the Cincinnati Traction Company, resulted in a decision in their favor, since Cincinnati has no charter.

The Cleveland Railway began the construction of tracks on Euclid Avenue, between East Twenty-second and East Fortieth Streets, at 4 a. m. on July 21. About three weeks will be required to complete the track. The company has not announced details of car routing when this section is placed in operation, but it is probable that all regular Euclid Avenue cars will be routed over it, while Wade Park cars and some others may continue to go over the Prospect Avenue track. Euclid Avenue cars will save about five minutes in running time by going over the new track, it is estimated. There is a possibility that the Prospect Avenue track may be extended from East Fortieth Street over Carnegie Avenue to East Fifty-fifth Street, but this has not yet been definitely decided.

New Electrification Project Reported.—It is reported that it is proposed to electrify the Schomburg & Aurora Railway, which extends from near Bond Lake to near Lloydtown, Ont. Part of the material has been ordered.

Rehearing Denied in Ulster & Delaware Case.—The first step in the appeal from the recent decision of the Public Service Commission for the Second District of New York denying the Ulster & Delaware Railroad permission to raise its mileage rate above the 2-cent maximum set by the Legislature, as noted in the ELECTRIC RAILWAY JOURNAL of July 17, was taken on July 16 when the commission formally denied the company's application for rehearing.

Commissioner Disfavors Civic Car Line Shops.—In reply to a request for an estimate of cost, Works Commissioner Harris on July 16 reported to the Board of Control that in his opinion it would be unwise to proceed with the establishment of civic car line shops in Toronto. He did not think the city could build cars as economically as a private company serving the whole of Canada. The reply was not considered satisfactory and the matter was referred for more details.

Change in Name of Oregon Commission.—On July 1 the name of the Railroad Commission of Oregon was officially changed to the Oregon Public Service Commission. Recognizing that the name "Public Service Commission" more correctly defines the powers possessed by this branch of the State service, the Legislature last winter passed an act providing for a change of name on July 1. There is no change in the jurisdiction of the commission. The commission has established an office in Portland.

Company Presents New Franchise in Waukegan.—The Chicago & Milwaukee Electric Railroad, Highwood, Ill., has presented a new franchise to the city of Waukegan, Ill. In this franchise it agrees to pay all back taxes but asks to be relieved of building the loop in the North Side residence districts within a period of one year. According to the franchise there must be at least three through cars in each direction. The company asks to be allowed to assume the franchise of the Waukegan, Fox Lake & Western Railway on certain streets until its expiration.

Iowa Section of N. E. L. A. to Meet at Dubuque.—The 1916 convention of the Iowa section of the National Electric Light Association is to be held in Dubuque instead of Ames, as previously announced. The former selection has been declared void on account of the illegal inclusion of votes by class "C" members, the choice of Dubuque being later made by a mail canvass among the qualified voters. It is considered probable that the Iowa District Gas Association and the Iowa Street and Interurban Association will hold their conventions at the same time and place.

Car Tax Proposed in Kansas City.—An ordinance has been introduced in the City Council taxing street cars of the Metropolitan Street Railway, Kansas City, Mo., $60 each a year. The measure is intended to become operative in case the reorganization of the street car system is effected, in which event the income to the city under the present "peace agreement" would cease. The city now receives 8 per cent of the company's gross income. Last year this amounted to $430,000, which paid the company's taxes, $274,000 and left about $160,000. Under the new franchise the city would receive no cash from the car fares until all revenue above 6 per cent, by being put into extensions and improvements, had raised the physical value of the property to $30,000,000.

Company Appeals Against Forced Extensions.—Counsel J. B. Howe of the Puget Sound Traction, Light & Power Company, Seattle, Wash., has filed in the Federal Court a formal appeal from a decision recently rendered by Federal Judge Frank H. Rudkin upon the company's application for an injunction against the Public Service Commission enforcing its order to extend its Alki Point, Fauntleroy Park and Ballard Beach lines beyond the termini provided by the company's charter. The company contends that the order violates the provision of the federal constitution forbidding the impairment of contract obligations, and also that it deprives it of vested rights without due process of law, for the reason that to comply with the order will mean a large financial loss upon these lines that cannot be offset by the operation of its other lines.

Financial and Corporate

ANNUAL REPORT

American Railways

The board of directors of the American Railways, Philadelphia, Pa., has changed the end of the fiscal year from June 30 to Dec. 31. For this reason the annual report recently issued shows only the operations for the six months to Dec. 31, 1914, as compared to the similar six months of the preceding year.

The total number of passengers carried was 54,461,989, a decrease of 837,941, or 1.51 per cent. The gross receipts of the subsidiary companies were $2,881,875.21, a decrease of $5,523.80, or 0.19 per cent. After payment of all operating expenses, interest and taxes, the net income was $294,087. Dividends were paid amounting to $254,615, leaving a balance of $39,472 to be added to surplus.

The subsidiary companies spent on maintenance of track, roadway and equipment, including sums set apart to cover depreciation, an amount equal to 18.81 per cent of the gross receipts. There was charged out of earnings to payments into sinking funds $19,554 and also paid and retired $15,000 of maturing car trust certificates, series A. Taxes accruing to state and federal governments amounted to $134,813, or 4.67 per cent of the gross receipts. An amount of $997,875 was expended for new capital purposes during the period.

In discussing individual companies the report notes that the Altoona & Logan Valley Electric Railway, Altoona, Pa., secured gross receipts of $319,335, a decrease of $16,119, or 5 per cent. Net receipts were $118,208, a decrease of only $5,285, a saving of $10,834 having been effected in operating expenses. The receipts of the Bridgeton & Millville Traction Company, Bridgeton, N. J., were reduced more than 7 per cent by the curtailment in general business. The gross receipts of the Chicago & Joliet Electric Railway, Joliet, Ill., were $306,181, a gain of $2,007, while the net receipts decreased $5,338. There was a slight falling off in the gross receipts of the railway, electric light and gas departments of the Lynchburg Traction & Light Company, Lynchburg, Va. Altogether it was but $2,088, or less than 1 per cent. The operating expenses in all three departments increased $24,817. There was set aside for reserve for depreciation of way and structures and equipment an additional sum of about 5.5 per cent of the gross receipts.

The Ohio Valley Electric Railway, Huntington, W. Va., reports gross receipts of $358,848, an increase of $30,356, or about 8.5 per cent. The railway earnings increased $12,222 and the lighting earnings $18,134. The gross receipts of the Peoples Railway, Dayton, Ohio, were $221,819, as compared to $243,681 in the prior period, a loss of 10 per cent. The net receipts increased $4,886. This reduction in operating cost was brought about largely by reason of improvement made in the operation of the power house. The Roanoke Railway & Electric Company, Roanake, Va., had gross business of $321,977, an increase of $8,812, or about 2.75 per cent. There was a net increase in lighting customers of 421 and a gain of 125 hp. in motors. The gross receipts of the Scranton (Pa.) Railway were $760,274, an increase of $18,395, or about 2.5 per cent. The Springfield (Ohio) Railway reported gross receipts of $178,405, a loss of $17,682, or 9 per cent.

LUMP VALUATION CRITICISED

The Missouri Public Utilities Commission was temporarily enjoined by Judge A. S. Van Valkenburgh of the United States District Court on July 7 from lowering the rates of the Springfield Gas & Electric Company, a subsidiary of the Federal Light & Traction Company. The practice of state commissions in making a lump valuation of a public utility property, and fixing a rate on this valuation without going into details, received a blow from the decision.

As reported in the ELECTRIC RAILWAY JOURNAL of July 11, 1914, page 87, the commission placed a valuation of $300,000 on the property of the company used in electric service, ordered a reduction of 30 per cent in rates and

held that 7 per cent was an adequate return on the investment as fixed. The restraining order is now granted evidently on the assumption that the valuation made by the commission was not in all respects a fair one, and the findings of the commission not made as required by law. An indemnifying bond is required of the company to protect consumers in case the courts finally uphold the rates as made by the commission.

In its decision granting the temporary injunction the court said: "The court has been embarrassed in its review by the form of the decision of the commission and its findings, which enumerate in general terms the items included but fail to specify the amount allowed for each. It may be doubted whether a decision and findings which state nothing but the total valuation fixed by the commission, without showing the amount allowed for each item included, would be a compliance with the manifest purpose of the law to permit the parties to test in court the questions involved." A determination of the merits of the case will be reserved for final hearing.

TAX VALUES SET IN WEST VIRGINIA

The announcement of the State Board of Public Works of West Virginia, made on July 19, showing the valuation of public properties for tax purposes, indicates an increase of $1,135,000 in the valuation of electric railway and power lines over the figures for 1914. The list of roads, wth the valuations that have been fixed by the State board for 1915, follow:

Appalachian Power Company	$240,000
Charleston Interurban Railroad	1,150,000
City Railway (Wheeling)	400,000
Charleston-Dunbar Traction Company	160,000
East Liverpool Traction & Light Company	210,000
Elkins Electric Railway	25,000
Fairmont & Mannington Railroad	400,000
Grafton Light & Power Company	130,000
Lewisburg & Ronceverte Electric Railway	40,000
Monongahela Valley Traction Company	5,000,000
Morgantown & Pittsburgh Railway	6,000
Morgantown & Wheeling Railway	175,000
Newell Bridge & Railway Company	125,000
Ohio Valley Electric Railway	1,075,000
Panhandle Traction Company	650,000
Parkersburg & Marietta Interurban Railway	1,000,000
Princeton Power Company	100,000
Steubenville, Wellsburg & Weirton Railway	350,000
South Morgantown Traction Company	35,000
Tyler Traction Company	225,000
Union Traction Company	110,000
Wheeling Traction Company	2,000,000
Wellsburg, Bethany & Washington Railway	40,000
West Virginia Traction & Electric Company (Wheeling)	1,100,000
West Virginia Traction & Electric Company (Morgantown)	425,000
Total assessments	$15,171,000

LOSS IN INDIANA VALUATIONS

The report of the Indiana State Board of Tax Commissioners shows a loss in electric railroad valuations of $188,347 over the 1914 totals. A large part of the decrease, however, resulted from changes in classification of the mileage reports of Indianapolis properties because of conditions made necessary by State regulation. The following shows the increase of values placed on electric railroad properties in Indiana for the past seven years: 1909, $21,536,041; 1910, $22,376,238; 1911, $23,524,951; 1912, $24,703,253; 1913, $25,701,134; 1914, $27,173,747; 1915, $26,985,400. The losses and gains in the trackage of the interurban roads are published in detail in the following table:

	1914, Miles	1915, Miles	Loss, Miles	Gain, Miles
Main track	2,137.25	2,087.20	50.05	....
Second main	91.65	148.02	....	56.37
Side track	108.50	109.77	....	1.27
Rolling stock	2,214.98	2,164.93	50.05	....
Totals	4,552.38	4,509.92	100.10	57.64

Some of the tax officials believed that some of the decrease in the electric railroad valuations might be attributed to jitney bus service in some of the cities, but it is probable that this is more or less a negligible consideration this year.

Chatham, Wallaceburg & Lake Erie Railway, Chatham, Ont.—The Hydro-Electric Power Commission of Ontario is negotiating with the Canadian Northern Railway for the purchase of the Chatham, Wallaceburg & Lake Erie Railway, which runs from Erie Beach to Wallaceburg.

Chicago (Ill.) Surface Lines.—The Illinois Public Utilities Commission has granted the application of the Chicago City Railway for permission to issue first mortgage 5 per cent gold bonds to the amount of $1,492,000. Permission has also been granted to the Calumet & South Chicago Railway to issue bonds of a similar character to a total amount of $500,000.

Detroit, Almont & Northern Railroad, Detroit, Mich.—An amount of $400,000 of first mortgage 6 per cent gold bonds of the Detroit, Almont & Northern Railroad, dated Feb. 1, 1915, is being offered by Eversz & Company, Chicago, at par and interest. The bonds are guaranteed and assumed as a direct obligation, by endorsement, by the Detroit United Railway.

Gary & Interurban Railroad, Gary, Ind.—Plans are being worked out for the financial relief of the Gary & Interurban Railroad. The City Council has refused to allow the line a straight 5-cent fare and insists that the 3-cent rate be maintained. It is said that the refusal of the Council to allow the increase will be brought to the attention of the Indiana Public Service Commission. There is some probability that the road will go before the commission and give up its Gary franchise. The company defaulted on its interest payments Jan. 1. Previous references to the condition of this company were made in the ELECTRIC RAILWAY JOURNAL of Jan. 9 and March 6.

Kansas City Railway & Light Company, Kansas City, Mo.—The committee of which John B. Dennis is chairman, has notified holders of certificates of deposit representing the 6 per cent five-year collateral gold notes of the Kansas City Railway & Light Company, due on Sept. 1, 1912, that the time in which depositors of such notes will be entitled to receive new securities or cash pursuant to a sale or a plan of reorganization of the company, or have the deposited notes or the proceeds thereof returned to them, has been extended for one year from Aug. 15, 1915.

Lancaster & York Furnace Street Railway, Millersville, Pa.—The Lancaster & York Furnace Street Railway has defaulted the July 1 interest payment of $2,750 on its $150,000 of first mortgage 5 per cent twenty-year gold bonds. It is reported that the failure of the company's bankers, Woelpper, Crawford & Company, Philadelphia, was the cause of the default.

London & Port Stanley Railway, London, Ont.—The lease of the London & Port Stanley Railway to the Père Marquette Railway terminated on June 30, on which date the property passed under the control of the Port Stanley Railway Commission. This is now operating the line as part of the proposed system of radial railways to be controlled and operated under the jurisdiction of the Hydro-Electric Power Commission of Ontario. The formal opening of the road as an electric carrier was set for July 22.

Merrill Railway & Lighting Company, Merrill, Wis.—The Merrill Railway & Lighting Company has announced that it will surrender its charter on account of not being able to operate except as a losing proposition. No cars are at present running.

Montreal (Que.) Tramways.—It is reported that the Montreal Tramways will issue $1,000,000 of new common stock which will be offered for sale to present stockholders at the par value thereof.

Rock Island Southern Railway, Rock Island, Ill.—The Rock Island Southern Railway, which operates the electric line from Monmouth to Rock Island, is to be reorganized and have its bonded indebtedness readjusted. On July 1 the "north line" was unable to pay interest due and also faced necessary repairs and extensions. A meeting of a number of bondholders was held and a plan of adjustment decided upon, request for approval being sent to other bondholders. In an interview, A. Walsh, president of the line, said: "I am confident that the plan of readjustment will be of great advantage to Monmouth. It will put the north line in excellent financial condition and in a position where it can give even better service than heretofore. Every bondholder is fully protected in the full amount of his holdings. For each $1,000 bond he receives a new first mortgage bond for $400, first preferred stock for $600 and $100 of bonus common stock. This common stock is given from that

held by the present stockholders. The value to Monmouth which is to come from this readjustment will be in many added improvements to the property, especially to the terminals at Rock Island. There will be added some electric locomotives to take the place of the present steam locomotives, thus increasing freight facilities and the general service." A complaint by minority stockholders was noted in the ELECTRIC RAILWAY JOURNAL of May 1.

San Joaquin Light & Power Corporation, Bakersville, Cal.—The San Joaquin Light & Power Corporation has filed a supplemental application with the California Railroad Commission, asking for authority to pledge a portion of the $1,582,000 of 6 per cent bonds which it was recently authorized to sell. The corporation proposes to pledge a portion of these bonds as collateral security for short-term notes of $809,000. It is proposed by the corporation that the new notes shall run for a period not to exceed two years, and that the money received therefrom shall be used to pay off the two-year collateral trust notes of the company which mature on Aug. 1, 1915.

Springfield (Mass.) Street Railway.—It is reported that plans for merging the Springfield Street Railway and the Worcester Consolidated Street Railway, which according to reports have been under consideration for the last five months, will probably materialize this year. It is believed that the plan under consideration is to consolidate the two companies into one large system with one set of officers and to establish a large general office in either Springfield or Worcester. These two companies are now owned and controlled by the New England Investment & Security Company, which is the holding company for nearly all the trolley lines formerly owned and operated by the New York, New Haven & Hartford Railroad in Massachusetts.

Tidewater Southern Railway, Stockton, Cal.—It is reported that the Tidewater Southern Railway has sold $100,000 of bonds to banks at Modesta and others, which has enabled it to commence construction to Turlock. In November, 1914, the company was operating 33.5 miles of single track between Stockton and Modesta.

Toledo, Ann Arbor & Jackson Railroad, Toledo, Ohio.—Application has been made to the Public Utilities Commission of both Ohio and Michigan by the Toledo, Ann Arbor & Jackson Railroad for permission to issue $385,000 of bonds. The company is laying track between Deerfield and Dundee and it is reported that a freight service may be established between Toledo and Detroit, as well as an interurban passenger business.

Tri-State Railway & Electric Company, East Liverpool, Ohio.—The Tri-State Railway & Electric Company has received permission from the Ohio Public Utilities Commission to sell its property in Ohio, a section of track in Steubenville, to the Steubenville Railway for $9,000. The latter company has been authorized to issue capital stock for that amount to pay for the track.

United Gas & Electric Corporation, New York, N. Y.—Through the purchase of $1,000,000 of its $5,500,000 of three-year 6 per cent notes, the sale of which was noted in the ELECTRIC RAILWAY JOURNAL of March 6, the United Gas & Electric Corporation has anticipated the retirement of $500,000 of the notes on July 1, 1916, and $500,000 on Jan. 1, 1917, as provided in the indenture covering the notes.

United Railways of St. Louis, St. Louis, Mo.—The quarterly report of the United Railways of St. Louis for the three months ending June 30, filed on July 15 with City Register Witter, shows the street cars carried about 2,160,000 more passengers in that quarter than in the previous three months. The statement also shows that the cars carried about 5,000,000 less than in the corresponding three months of last year, which was before the jitneys began to operate in St. Louis. Officials familiar with the conditions assert that a portion of the 5,000,000 decrease in passengers was due to the operation of jitneys and the remainder was due to business conditions. The increase in the last quarter indicates that the business of the jitneys is decreasing and that general business is becoming more active. The cars made a total of 1,535,366 trips and traveled 9,699,118 miles in the last three months. A total of 54,522,328 full-fare passengers were carried and 1,112,985 half-fare, making a total of 55,635,313 passengers. The total number of passengers transported in the preceding three months was 53,475,810. The number in the corresponding three months last year was 61,959,691.

DIVIDENDS DECLARED

American Railways, Philadelphia, Pa., quarterly, 1¾ per cent, preferred.

Columbus Railway, Power & Light Company, Columbus, Ohio, quarterly, 1¼ per cent, preferred and common.

Commonwealth Power, Railway & Light Company, Grand Rapids, Mich., quarterly, 1½ per cent, preferred; quarterly, 1 per cent, common.

Grand Rapids (Mich.) Railway, quarterly, 1¼ per cent, preferred.

Lewiston, Augusta & Waterville Street Railway, Lewiston, Maine, quarterly, 1½ per cent, preferred.

Montreal (Que.) Tramways, quarterly, 2½ per cent.

Philadelphia Company, Pittsburgh, Pa., 5 per cent, preferred.

West Penn Railways, Pittsburgh, Pa., quarterly, 1¼ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
AMERICAN RAILWAYS, PHILADELPHIA, PA.					
1m., June, '15	$444,033	.....	.....	.....	.....
1 " " '14	477,789	.....	.....	.....	.....
6 " " '15	2,575,604	.....	.....	.....	.....
6 " " '14	2,673,349	.....	.....	.....	.....
BERKSHIRE STREET RAILWAY, PITTSFIELD, MASS.					
1m., May, '15	$77,502	*$64,276	$13,226	$17,124	†‡$3,763
1 " " '14	86,037	*70,610	15,427	17,014	††1,294
11 " " '15	872,665	*779,974	92,691	189,462	††95,236
11 " " '14	908,492	*790,687	117,805	187,778	††68,106
CONNECTICUT COMPANY, NEW HAVEN, CONN.					
1m., May, '15	$687,528	*$455,724	$231,804	$104,964	‡$163,238
1 " " '14	720,692	*474,825	245,867	93,368	‡174,014
11 " " '15	7,274,970	*5,265,413	2,009,557	1,087,674	‡1,174,493
11 " " '14	7,347,174	*5,353,249	1,993,925	984,003	‡1,248,673
FORT WAYNE & NORTHERN INDIANA TRACTION COMPANY, FORT WAYNE, IND.					
1m., May, '15	$141,502	$82,278	$59,224	$54,608	‡$4,896
1 " " '14	154,514	92,192	62,322	53,953	‡8,727
5 " " '15	707,782	406,383	301,399	268,479	‡34,519
5 " " '14	761,209	438,809	322,400	259,455	‡64,225
KENTUCKY TRACTION & TERMINAL COMPANY, LEXINGTON, KY.					
1m., May, '15	$66,220	$35,035	$31,185	$19,758	‡$14,135
1 " " '14	68,091	36,163	31,928	20,639	‡14,093
11 " " '15	738,410	393,342	345,068	219,507	‡158,825
11 " " '14	707,261	374,284	332,977	225,501	‡137,769
LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, ME.					
1m., May, '15	$61,014	*$37,677	$23,337	$15,611	$7,726
1 " " '14	58,572	*37,390	21,182	15,660	5,522
12 " " '15	698,453	*459,753	238,700	187,112	51,588
12 " " '14	679,179	*455,935	223,244	184,116	39,128
NEW YORK (N. Y.) RAILWAYS					
1m., May, '15	$1,138,652	$714,040	$424,612	$357,179	‡$107,748
1 " " '14	1,199,849	766,741	433,108	348,800	‡118,904
11 " " '15	12,265,626	7,843,631	4,421,995	4,100,368	‡801,915
11 " " '14	12,684,866	8,066,814	4,618,052	4,089,333	‡897,482
NEW YORK & STAMFORD RAILWAY, PORT CHESTER, N. Y.					
1m., May, '15	$32,228	*$25,953	$6,275	$7,991	†‡$1,676
1 " " '14	33,151	*25,326	8,125	7,964	‡188
11 " " '15	340,796	*281,903	58,893	87,052	††27,746
11 " " '14	334,509	*273,526	60,983	85,265	††23,866
NEW YORK, WESTCHESTER & BOSTON RAILWAY, NEW YORK, N. Y.					
1m., May, '15	$43,000	*$41,199	$1,801	$5,976	††$4,104
1 " " '14	39,230	*38,737	493	4,806	††3,878
11 " " '15	409,509	*476,641	†67,133	69,584	††134,985
11 " " '14	364,644	*518,802	†154,158	61,966	††210,818
RHODE ISLAND COMPANY, PROVIDENCE, R. I.					
1m., May, '15	$404,577	*$321,295	$83,282	$117,558	††$33,436
1 " " '14	487,006	*302,726	184,280	111,264	‡73,891
11 " " '15	4,668,386	*3,629,383	1,039,003	1,296,807	††163,108
11 " " '14	4,891,423	*3,603,923	1,287,500	1,191,963	‡213,254
VIRGINIA RAILWAY & POWER COMPANY, RICHMOND, VA.					
1m., May, '15	$407,694	$203,572	$204,122	$136,683	‡$74,451
1 " " '14	433,496	203,492	230,004	135,672	‡100,764
11 " " '15	4,679,421	2,263,584	2,415,837	1,499,170	‡991,010
11 " " '14	4,717,587	2,252,466	2,465,121	1,479,631	‡1,062,667
WESTCHESTER STREET RAILROAD, WHITE PLAINS, N. Y.					
1m., May, '15	$22,644	*$22,036	$608	$1,464	††$836
1 " " '14	23,516	*18,542	4,974	1,110	‡3,872
11 " " '15	235,700	*246,828	11,128	14,633	††25,635
11 " " '14	228,579	*233,330	†4,751	12,208	††16,764

*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

TRAVELS WITH THE JITNEY

Philadelphia Ordinance Enjoined—Union Men in Norwalk Petition for Jitney Control—Jackson Company Affected by Competition

A preliminary injunction restraining the Mayor, Councils and other city authorities of Philadelphia from enforcing the jitney ordinance was granted on July 15 by Judge Sulzberger. The injunction holds until Sept. 20, when the Court of Common Pleas No. 1 may be applied to for a further hearing by either the city or the jitney operators. In the meanwhile, the court decrees, both sides may gather further evidence which will aid in arriving at a just decision on the whole question. Judge Sulzberger stated that the operation of the ordinance involves serious danger to the jitney, and would at least cut the business from 100 to 40 per cent, but that if the ordinance is declared valid, the delay will not have caused the city any pecuniary loss. A committee of three has been appointed to confer with Director Porter and agree on a set of temporary traffic regulations during the term of the temporary injunction.

Two of Philadelphia's jitney organizations, representing more than 700 operators, have decided to issue strip tickets at six for a quarter. They will be accepted in lieu of 5-cent fares by drivers of all cars operated by members of the Auto Service Association and the South Philadelphia Jitney Owners' Association. The only organization which has not signified its intention to issue strip tickets is the Jitney Association, whose president has announced that he would put the question up to his associates.

A committee representing the Norwalk Division of the Amalgamated Association of Street and Electric Railway Employees of America has petitioned the Council on behalf of the union that favorable action be taken on an ordinance presented by them to control and regulate the jitney business in Norwalk, Conn. The ordinance is strict and provides for annual fees of $100 and $200, fixed routes with transfers and indemnity bonds of $10,000. The ordinance was tabled for consideration at a future meeting of representatives of the union, jitney drivers and Council.

The draft of a jitney ordinance, submitted by Commissioner Arthur R. Denman to the Board of Works of Newark, N. J., on July 15 and laid over for further discussion, provides that car owners or licensees must report to the board the route and hours of service of each jitney, seating capacity, and what other facts may be required, as often as the board may so demand. The board receives the power to designate routes and hours of service, which shall not be less than ten hours daily; terminal points and the fixing of regulations for turning at the terminal.

B. W. Arnold, superintendent of traffic Chicago, Ottawa & Peoria Railway, Ottawa, Ill., has presented a copy of the Joliet ordinance to the La Salle City Council, with the request that they adopt it or some similar measure to regulate jitney buses. Mr. Arnold gave a short talk to the Council, in which he said that the interurban company had spent almost $25,000 for paving in the twin cities, La Salle and Peru, in two years. He also said the company had an annual payroll of $24,000 in La Salle and Peru. He asked that the jitney buses be licensed, forced to pay a fee of $200 per year and compelled to publish and maintain a regular schedule. The petition was referred to a committee for investigation.

H. H. Davell, chairman of the board of governors of the Maryland Autobus Protective Association, formed to adopt some method of perfecting the jitney system in Baltimore, states that the association aims to amalgamate all the jitney service into one large corporation. It is stated that 300 buses can be put on the streets. Immediate steps are to be taken in the courts to test the validity of the ordinance just passed whereby each jitney owner will be required to pay an annual license of $25 a seat.

One hundred and twenty-six jitneys have succeeded in passing municipal inspection in Portland, Ore., according to Municipal Jitney Inspector Gallup. Cars are being examined at the rate of twenty-five per day. The State Supreme Court has taken under advisement the suit instigated by A. A. Thielke against Mayor Albee of Portland, to restrain enforcement of an ordinance regulating jitney buses in Portland. The ordinance was attacked in the Circuit Court on the ground that it was submitted to the people under a city ordinance, instead of under a State law; that it was discriminatory, gave the Public Utilities Commission arbitrary power, and violated the federal constitution, in that it would permit property to be taken without due process of law.

According to the report of L. H. Bean, general manager Tacoma Railway & Power Company, the jitney buses operating in Tacoma, Wash., have cut down the company's revenues $70,000 for the first half of 1915. The city of Tacoma will lose $1,500 in its share of gross receipts for this period. The police department in Tacoma has been instructed by Commissioner of Public Utilities Mills to arrest jitney passengers and drivers who violate the anti-smoking ordinance recently passed by the Council. This ordinance affects street cars and jitney buses alike and is being rigidly enforced on the cars.

The Jackson Light & Traction Company, Jackson, Miss., has filed with the City Commission an earnest protest against the insufficient character of ordinances regulating jitney traffic, and the unfair competition it has been forced to meet since the jitney became popular. In a letter to the commission Manager Raymond H. Smith insists that all jitneys should be placed under bond, in order to guarantee damages in case of accidents, and offers to furnish bonds for each street car operated by his system.

Some time since the commission passed an ordinance regulating jitney traffic, but Manager Smith says that it is not in any sense a regulation; that jitneys are not required to carry signs showing the routes they cover; they do not cover regular routes, it being their custom to traverse the busiest sections of the streets, turning around directly in front of trolley cars where people are waiting to pick up passengers, withdrawing the jitneys from service whenever they feel like it and otherwise avoiding the responsibilities of a common carrier.

Manager Smith admits that the jitneys have cut heavily into the revenues of the street railway and advises the commission that the company has been compelled to ship some of its larger cars out of town, to cut down the number of cars operated and to discontinue the services of a number of employees.

Automobile owners operating a jitney line between Texas City and Galveston, Tex., have filed two suits in the Fifty-fifth District Court at Galveston asking for an injunction to prevent city officials of Galveston from enforcing an ordinance adopted on April 9, regulating the operation of motor buses in that city. It is claimed by the plaintiffs that they are immune from provisions of the ordinance because their buses are not operated between points in Galveston or to any designated point within Galveston.

A petition for an election to recall Mayor Tyra and Police Commissioner Hudleston of Fort Worth, Tex., has been prepared by the jitney men of Fort Worth and will be presented to the City Commissioners within a few days. The petition, signed by about 3000 voters, is a result of the jitney ordinance now being enforced.

The Savannah AutoBus Company, with an authorized capital of $250,000, has been incorporated by Savannah men for the purpose of operating autobuses on Savannah streets. The company has asked for a charter and will begin operations in August with ten buses of a capacity of thirty-five passengers each. There will be definite routes and schedules for the vehicles.

An ordinance has been passed by the Minneapolis (Minn.) City Council for the purpose of regulating jitneys in that city and signed by Mayor Nye. The ordinance provides for a license fee of $15 a year for each car, indemnity bonds from $5,000 to $10,000, regular routes and schedules, with a limit of two passengers above seating capacity, inspection of cars and other regulations. It will take effect on Aug. 1.

Jitney bus owners in Flint, Mich., have obtained a temporary injunction restraining the city from enforcing the new jitney ordinance. It was asserted that the $5,000 to $20,000 bond and $25 license fee were excessive. There are 151 jitney buses in Flint, sixty in service continually. The others operate only during rush hours.

HALT FOR KANSAS CITY JITNEYS

Buses of Jitney Corporation Seized on Note—Touring Cars Decreasing—One Line Raises Fare to 10 Cents

The jitney transportation situation is rapidly coming to a head in Kansas City, Mo. The Studebaker Corporation on July 18 took possession of fifteen buses furnished by it on a forty-bus order from the Kansas City Jitney Transportation Company, for failure of the company to meet a note due on a first mortgage. The National Jitney Association is quiescent, the offices are closed and no definite plans in hand. The White Star line of buses, embracing thirteen cars, individually owned and co-operating on schedules, began on the night of July 19 at the rush hour to charge 10 cents instead of the previous 5 cents a trip. Many individual buses have been eliminated, and the touring cars now in service on routes number only about sixty.

The embarrassment of the Kansas City Jitney Transportation Company is a serious blow to the industry. Its president is W. H. Miller, the leader of the movement in the West. Mr. Miller said of the situation: "We are now working on a plan of reorganization, and hope to get the buses back soon. We are compiling statistics of operation and management which will show where we have fallen short of the profitable operating plan."

It is said that the trouble was caused by large overhead expenses, as well as by the obvious difficulties encountered where a transportation company must hire men to collect money and handle expensive machinery. An officer of the Studebaker branch at Kansas City said that the buses were in good condition, showing 14,000 to 15,000 miles in the three months since they were put in service. He expressed confidence that jitney buses would pay at 5-cent fares when individually owned and carefully handled.

The White Star line owners have had a smaller overhead than the organized company, but they were glad of the chance to increase the fare to 10 cents. Their cars are mostly of the more expensive types. They confine themselves to routes to the southeastern part of the city. They admit only buses to their organization, contending that the touring cars are profitable only for popular priced livery service.

One local livery service, the outgrowth of the split between the private owners and the company organized by Mr. Miller, is said to be making good profits. It now has the stand and the telephones vacated when the Kansas City Jitney Transportation Company gave up its downtown headquarters.

The national association seems falling to pieces because of the failure of the local associations to pay dues for the support of the offices and to carry on the organization work. The National Indemnity Exchange, an insurance organization formed to protect jitneys, has not yet qualified, but may get its license soon.

JITNEY MOVEMENT IN OHIO

Jitneys Used in Many Ohio Cities—Meeting Ordinance and Regulatory Restrictions

The operation of jitney buses in Ohio is perhaps more extensive than might be anticipated. They have made little headway, however, in the largest cities.

In Columbus their operation seems to have been fairly successful. There operators have provided themselves with large cars with longitudinal seats. They operate over certain streets on regular schedules and sell tickets at the rate of six for 25 cents.

Toledo bus owners have asked the City Council to allow them to receive and discharge passengers at the same points at which the street cars stop. Up to the present time they have been compelled to observe the traffic rules and make stops at the safety zones, which are about 100 ft. from the street crossings.

Twenty-two bus operators paid the license fee required by the ordinance recently passed by Council at Youngstown, although the payment was made under protest. Operators in that city must obey the traffic ordinance.

In Lorain the bus operators have formed the Lorain Jitney Association and are now endeavoring to establish a schedule on the streets occupied by car lines, so they may have a five-minute headway. The street railway company recently inaugurated a ten-minute service and found that a gain of patronage was the result.

At Ashtabula thirty buses were put out of business on July 13 by the decision of Common Pleas Judge A. G. Reynold sustaining the regulatory ordinance passed by the City Council some time ago. The ordinance fixed an annual tax of $25 and required a bond of from $3,000 to $5,000, depending upon the size of the car. The jitney owners consider the ordinance prohibitive.

For a time quite a number of buses were operated in Cleveland, but for the most part they consisted of disreputable cars that people would not patronize. Since no one came forward with money to furnish the right kind of cars, it must appear to be a losing proposition in the face of the low street railway fare. Little comment is now heard in regard to the matter.

The Mahoning & Shenango Railway & Light Company brought matters to a climax at Youngstown on July 18 by refusing all jitneys entrance to Idora Park, which is owned and controlled by railway interests. An admission fee was also charged all visitors who entered the park in vehicles other than street cars. Those who paid, however, received street railway tickets for the return home. Owners of jitney buses retaliated by having three park employees arrested on the charge of violating Sunday closing laws. Vice-President Randall Montgomery of the company signed bonds for the employees and then announced that every jitney bus would be stopped and every store closed in Youngstown next Sunday unless the suits against the men are dropped. The fight between the railway and the jitneys promises interesting developments in the enforcement of the blue laws.

On July 19 the Ohio Electric Railway requested the city of Lima to return $5,000 which it had deposited for the right to transport passengers to intercity points. The company says its business has shown a decline of 50 per cent at that point since jitney buses began operation within the city limits, and that as a consequence there must be reduced service until regulatory ordinances are adopted.

BRIDGE TRAFFIC IN NEW YORK

The Public Service Commission for the First District of New York has received from the bridge department the result of the annual count of passengers using the East River bridges in one period of twenty-four hours. The count was made on Nov. 5, 1914, from midnight to midnight. It shows a total traffic in both directions over all bridges of 763,982, which is an increase of 20,090 over the previous year. This is a gain of about 3 per cent, and much smaller than the gain of 1913 over 1912, which was more than 12 per cent. The Williamsburg Bridge still continues in the lead, carrying more passengers than the old Brooklyn Bridge. The latter is the only one of the four bridges which shows a positive falling off in the number of passengers using it. The figures include passengers in surface and elevated cars, in all kinds of vehicles, and pedestrians using the promenades. The following table shows the number of passengers passing in each direction over the four bridges:

	Williamsburg	Brooklyn	Queensboro	Manhattan
Eastbound	162,859	151,334	45,915	26,591
Westbound	164,275	142,372	43,932	25,804
Totals	327,134	293,706	89,847	52,395

Total traffic: 1912, 659,591; 1913, 742,992; 1914, 763,082.

The Brooklyn Bridge led all other bridges in traffic until the Center Street loop subway was opened in August, 1913, and connected with the elevated lines passing over the Williamsburg Bridge. This resulted in a large increase of the traffic over the Williamsburg Bridge.

Rockland Transfer Petition Granted.—The petition of the selectmen of Rockland for free transfer privilege on the Bay State Street Railway, Boston, Mass., has been granted by the Public Service Commission, with the understanding the company may soon ask for a readjustment of fares.

Near-Side Stop Approved for New Bedford.—The Massachusetts Public Service Commission has approved a regulation, passed by the Board of Aldermen on Oct. 22, 1914, that

near-side stops be used in New Bedford after Aug. 1. The commission also approved the clause requiring a safety stop to be installed on all street cars passing Bedford and County Streets.

Wage Increase Granted in Waterville.—It was announced on July 16 by Manager Patterson of the Waterville, Fairfield & Oakland Street Railway that a general advance of 1 cent per hour had been made in the pay of all men employed on the system. Bonuses for efficiency make a possible increase beyond this of about $1 per week.

Petition for Fare Increase Withdrawn.—The Berkshire (Mass.) Street Railway has withdrawn its petition for a 6-cent fare over certain of its lines and a readjustment of its fare limits. The company is studying some other systems of fare arrangements and needed more than the three remaining months of life of the petition to complete its investigations. Ultimately another petition will be filed with the commission.

Good June Record in Louisville.—The Louisville (Ky.) Railway is holding up before its trainmen for their emulation in future months the excellent June record, in which only two collisions between cars were reported. These collisions were inconsequential and concerned bumping together of empties in the carhouses. During the same month the mileage was 963,939 car-miles for the city lines and 210,156 car-miles for the interurban lines, or a total of 1,173,095 car-miles.

Teaching Patrons in Elgin.—Patrons are being taught how to board street cars properly in Elgin, Ill., an experiment having been inaugurated on the Grove Avenue line. A white line has been painted a few feet from the track, and the patrons are asked to stay within this space and to line up in the same orderly way in which they approach a ticket window. There has been successful regulation of taxis and other motor vehicles in Elgin by the City Council, and the street railway wishes to carry the safety campaign further.

Tariff Supplement Issued to Cover Cummins' Amendment.—The baggage committee of the Central Electric Traffic Association at its recent meeting in Fort Wayne, Ind., decided to issue a supplement to the tariff in compliance with the Cummins' amendment to the interstate commerce act. Under the new system persons desiring to check for interstate movement baggage that is valued at more than $100, will be required to pay an insurance fee. Persons who refuse to sign the slip giving the valuation cannot check their baggage.

Railroad Asks for Rescission of Service Order.—The Hocking Valley Railroad, Columbus, Ohio, filed a petition with the Ohio Public Utilities Commission on July 7, asking that the order requiring electric car service between Jackson and Hamden be rescinded. The following day the original complainants filed charges to the effect that the company is not now complying with the order, that steam cars are being used instead of electric cars and that they stop at the stations instead of in the center of the towns, as in the past. Previous reference to this order was made in the ELECTRIC RAILWAY JOURNAL of April 17.

New Summer Car Being Tried in Toronto.—The Toronto (Ont.) Railway is trying out a new type of summer car in compliance with the order of the Ontario Railway Board to place fifty new cars, which are to be approved by the board, the Toronto Railway and the city engineer. The new car is fitted with longitudinal seats on the devil-strip side and cross-seats on the open side. Instead of the side steps there is a wire grilling to protect the public. Passengers enter at the rear platform and leave by the front door as in the winter cars. Of the fifty cars included in the board's order, twenty have already been built on the plan previously in use, except that they are 3 in. wider. These cars, which are the widest that it is possible to operate on the present lines, will have to be changed if this test car meets with approval.

Accidents Have Decreased in Detroit.—W. E. Cann, chairman of the general safety board of the Detroit (Mich.) United Railway, in reporting the progress of the safety campaign to the safety committeemen, stated recently that since the organization of the movement there has been a continual decrease in the number of accidents. The number of collisions has decreased more than 40 per cent; running over steam and street railway crossings, nearly 50 per cent; derailments, more than 10 per cent, and platform accidents to passengers, nearly 40 per cent. The only marked increase in accidents are those where automobiles have been struck, and Mr. Cann takes the position that it is entirely reasonable to lay the burden of this increase upon the increased number of automobiles and the carelessness of the drivers.

Fillmore Street Hill Operation for the "Movies."—Moving pictures have been made illustrating the operation of two-car trains on the United Railroads of San Francisco Fillmore Street hill line and are being shown with a popular "News of the Week" series in Pacific Coast cities. The reels start out with the diagrams of the cable connection details and safety devices, and show in proper order the methods of coupling, signaling and operating the trains. The most striking feature is the operation over the hill of two two-car trains coupled together and counterbalanced by a single two-car train. The four cars are stopped and held stationary on the 25.4 per cent grade. The underlying idea of the film is the advertisement of the absolute safety of the hill line since the recent installation of new safety devices.

Mr. Harmon Reports Accident Decrease.—James Harmon, general claim agent of the Insull lines in Indiana, while in New Albany on July 16 gave out a statement to the effect that the accident roll of the Louisville & Northern Railway & Lighting Company, the Louisville & Southern Indiana Traction Company and the Interstate Public Service Company, altogether making about 120 miles, and the Columbus (Ind.) city lines as well, showed a decrease of seventy accidents for the first six months of 1915, as compared with the last half of 1914. This decrease in casualties is attributed practically altogether to the safety-first efforts which have been made by the companies listed. The list for the last six months contains two fatalities resulting from an accident on the Louisville & Southern line, an accident, however, which was caused by reckless driving of the victim's automobile.

Skip-Stop to Be Tried in Chicago. — Plans have been carefully perfected by the Chicago (Ill.) Surface Lines for the installation of an experimental skip-stop line on North Clark Street, one of the heavy trunk lines out of the loop district to the north side of the city. This line is 10.7 miles in length, and the skip-stop schedule will begin about 0.5 mile outside of the loop district. The Chicago plan differs from that adopted in Cleveland and Kansas City in that the stops were designated as a result of a traffic survey. The total number of 120 stops on this line will be reduced to seventy, and it is contemplated that the skip-stop schedule will reduce the running time fifteen minutes for each round trip. All stops will be designated by a white band painted around the company's tubular-steel poles. If the experiment proves satisfactory, the skip-stop idea will be extended to other lines.

Pension System Established for Third Avenue Employees.—Frederick W. Whitridge, president Third Avenue Railway, New York, has announced the establishment of a pension scheme for the employees of the company and its subsidiaries. Pensions to be granted will range from $20 to $40 a month, the amount being based in part on the length of service and in part on the monthly pay received by the employee. Only those employees will be eligible who become members of the Third Avenue Railway Employees' Association and whose membership is continuous up to the time of the granting of the pension. The money for the payment of the pensions will be obtained by applying the interest of funds of the benefit association, and from the treasury of the Third Avenue system, which will pay whatever additional sum may be necessary. Any employee who has reached the age of seventy years, whether incapacitated or not, and who has been in continuous service of the system for at least twenty years will be entitled to a pension. Provision also is made for pensions for employees who have reached the age of sixty-five who have been incapacitated after being in the service for twenty years.

Personal Mention

Mr. Thomas Lynch, formerly superintendent of employment of the Detroit (Mich.) United Railway, has been appointed superintendent of trainmen's records. Mr. Lynch has been employed by the company continuously for thirty-five years.

Mr. Francis X. Disney, Elmira, N. Y., has been named secretary of the Public Service Commission for the Second District of New York, to succeed Mr. Frank H. Mott, whose selection for the counselship is elsewhere noted. Mr. Disney has been assistant secretary for the last two years.

Mr. Ledyard P. Hale, counsel for the Public Service Commission for the Second District of New York since its organization, has received a leave of absence without pay until Sept. 1 on account of the press of his duties as chairman of the public utility committee of the constitutional convention.

Mr. E. R. Giaque, formerly carhouse foreman at the Fourteenth carhouse of the Detroit (Mich.) United Railway, has been made assistant superintendent of the Fourteenth, Crosstown and West Warren lines to succeed Mr. Albert Bath, who has been appointed superintendent of these lines.

Mr. Arthur F. Brown has been appointed superintendent of employment of the Detroit (Mich.) United Railway. He has been in the company's employ for twenty years in various capacities, serving as inspector, carhouse foreman, chief inspector, assistant superintendent of both city and interurban divisions, and for the last twelve years as superintendent of various city lines.

Mr. Frank H. Mott, Jamestown, N. Y., formerly a deputy attorney-general and for the last two years secretary of the Public Service Commission for the Second District of New York, has been named counsel of the commission during the leave of absence until Sept. 1 of Ledyard P. Hale, noted elsewhere in this column. It is understood that upon Mr. Hale's return Mr. Mott will resume his private practice of law.

Mr. Albert Bath has been appointed superintendent of the Fourteenth, Crosstown and West Warren lines of the Detroit (Mich.) United Railway, to succeed Mr. Arthur F. Brown, whose appointment as superintendent of employment is elsewhere noted. Mr. Bath had been assistant superintendent of these lines for the last five years, previously for three years being employed as night and day carhouse foreman at various carhouses.

Mr. J. D. Cornell has been appointed traffic manager of the Joplin & Pittsburgh Railway, with headquarters at Kansas City, Mo. Mr. Cornell in 1904 was attached to the Southwestern Tariff Committee at St. Louis, and later as an adjuster traveled over much of the territory. Five years ago he took up electric railway traffic specialization, when he went to the Rock Island Southern Railroad as general freight and traffic agent to develop the traffic industry of that composite line, which handled freight chiefly by steam trains and passengers by electric.

Mr. Walter Jackson, associate editor ELECTRIC RAILWAY JOURNAL, has been appointed business manager of this publication. Mr. Jackson was born in 1882. He left public school at the age of thirteen, but entered the Cooper Union Night Schools within the following year, graduating therefrom as bachelor of science. In 1903, following service with several machinery companies, he joined the editorial staff of this paper. In connection with his editorial work, Mr. Jackson has traveled extensively, including several trips abroad. He has also acted as consulting editor with the McGraw-Hill Book Company in addition to preparing for that firm a "Handbook of Electrical Methods" and "Electric Car Maintenance."

Mr. G. R. G. Conway, for the last four years chief engineer of the British Columbia Electric Railway, Vancouver, B. C., has resigned that position to take up work as general consulting engineer, with offices in Toronto. In connection with his new engineering work Mr. Conway has been appointed consulting engineer for the British Columbia Electric Railway. Mr. Conway's term of service with this company covered a period of very rapid development, during which he carried out for the company many large undertakings. Among these were the construction of the great dam at the outlet of Lake Coquitlam; the enlargement of the company's existing power house on the North Arm of the Inlet, and the construction of the new No. 2 power house, increasing the output of the Coquitlam-Buntzen hydraulic project to more than 85,000 hp.; the construction of a 130-ft. dam on the Jordan River, Vancouver Island, and the consequent enlargement of the Jordan River power plant to a capacity of 20,000 hp.; the construction of a steam auxiliary plant at Brentwood Bay; the enlargement of the Vancouver steam auxiliary plant, and the laying of many extensions of lines on both the mainland and the island. Mr. Conway received his early training in Great Britain. There he was connected with many large engineering projects and performed important work for the cities of Birmingham and Aberdeen. Later he went to Mexico, where he carried out engineering projects for the Monterey Railway, Light & Power Company. Mr. Conway is a member of numerous engineering organizations in Europe and America, and has contributed many valuable addresses and papers for the records of these societies. The retirement of Mr. Conway was marked by a dinner tendered him by officials of the company at the Hotel Vancouver, Vancouver, on June 26. Mr. George Kidd, general manager, presided and read a cablegram from the London board expressing regret at the retirement of Mr. Conway and appreciation of his work for the company. The office staff presented Mr. Conway with a mounted solid silver rose bowl.

Mr. William A. Del Mar has resigned from the electrical engineering department of the New York Central & Hudson River Railroad to accept a position on Aug. 2 as assistant electrical engineer of the Interborough Rapid Transit Company of New York. Mr. Del Mar has been connected with the New York Central Railroad since 1904, engaged in technical problems connected with the electrification. He has also taken a prominent part in committee work with various technical associations, particularly in connection with standardization, being a member of the A. I. E. E. standard committee in 1914 and 1915, chairman of the 1914 railway standard committee which prepared the Institute's present railway standards, chairman of the 1915 wire and cable committee which is engaged in the standardization of cable stranding, and a member of the 1914 wire and cable sub-committee which prepared the wire and cable standards. He has also been chairman for the past three years of the wire and cable committee of the Association of Railway Electrical Engineers. The specifications of this committee have been adopted largely by the American Electric Railway Association and the American Society for Testing Materials. He has also been secretary of the joint rubber insulation committee and has contributed papers on the question of standardization, as well as upon other subjects, to the columns of this paper and to those of the *Electrical World*. Mr. Del Mar is a native of San Francisco, where he was born on Dec. 15, 1880. He went to Europe in 1887 owing to the desire of his father, who is the author of numerous historical books, to be near the libraries and archaeological collections of Europe. He was educated in France and England, and was graduated in 1900 from the City and Guilds' College of London. After coming to this country he joined the testing department of the General Electric Company in 1900, and in 1902 entered the engineering forces of the Manhattan Railway, where he remained until he became associated with the engineering force of the New York Central Railroad. He is the author of "Electric Power Conductors" and of some of the sections in Penders' "American Electrical Engineers' Handbook" and is a member of the A. I. E. E., the A. E. R. A. and the A. R. E. E., and is an associate member of the I. E. E. of England.

OBITUARY

Louis F. Beckert, a salesman with the Westinghouse Electric & Manufacturing Company, died on July 7 in Pittsburgh. Mr. Beckert was born in Pittsburgh in 1886, and he was graduated from Pennsylvania State College in 1907.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Peoria & Chillicothe Electric Railway, Peoria, Ill.—Incorporated in Illinois to build an interurban railway from Peoria to Chillicothe, 18 miles. Incorporators: E. A. Mitchell, E. V. Mattice, John F. Lynch, Chillicothe, and A. C. Black, Peoria.

***South Brownsville Street Railway, South Brownsville, Pa.**—Application will be made by this company for a charter to construct an electric railway from Brownsville to South Brownsville. Among those interested are W. E. Moore, J. S. Jenks, H. L. Mitchell, D. I. McCahill and E. T. Brashear.

***Mitchell Street Car & Interurban Railway, Mitchell, S. D.**—Incorporated in North Dakota to construct an electric railway. Plans are being made to construct three miles of city line this year. Capital stock, $200,000. Incorporators: O. F. Cassem and A. N. Hill, Mitchell, and D. N. Hill, Lake Hills, Iowa.

FRANCHISES

Los Angeles, Cal.—The Pacific Electric Railway has received an ordinance from the Council of Los Angeles granting permission to discontinue service and remove the tracks on its Colgrove Line on Santa Monica Boulevard approximately 150 ft. east of the center line on Avery Street; thence northwesterly over private property and intersecting streets, to a point in Vermont Avenue north of Sunset Boulevard; thence northerly along Vermont Avenue to a connection with its Hollywood Line at Vermont Avenue and Hollywood Boulevard.

Bridgeport, Conn.—The Connecticut Company has asked the Council for a franchise to relocate its tracks on North Avenue from North Main Street to Trumbull Road, Bridgeport.

Amherst, Mass.—The Holyoke Street Railway has asked the Council of Amherst for a franchise to extend its tracks on South Pleasant Street to land which the company bought last year for the erection of a new power house and carhouse.

Wakefield, Mass—The Bay State Street Railway has asked the Council for a franchise to alter and relocate its tracks on Main Street, Wakefield.

Pontiac, Mich.—The Detroit, Pontiac & Owosso Railway has received a franchise from the Council to construct a railway in Pontiac, with the choice of Oakland Street, Baldwin Street, Elizabeth Lake Avenue and Huron Street. [June 19, '15.]

Buffalo, N. Y.—The International Railway has asked the Council for a franchise to lay special tracks on Ohio Street, Buffalo, for the accommodation of travelers on lake boats.

Cleveland, Ohio.—The Cleveland, Akron & Canton Terminal Railway has received a franchise from the Council to construct a subway under East Fifty-fifth Street from the lake to the southerly limits of the city. This is part of a plan to construct a railway from Cleveland along the old Ohio Canal to Dresden. [May 8, '15.]

Columbus, Ohio.—The East Linden Electric Railway has asked the Council for a twenty-five-year franchise for the construction of its line over two sections of the city. The first begins at Hayes Avenue and Leonard Avenue and extends via Hayes Avenue, Mount Vernon Avenue and Champion Avenue to Long Street. The second begins at the corporation line where it cuts Hudson Street, extending west on Hudson Street to Neil Avenue, North on Neil Avenue to Dodridge Street and thence west to the Olentangy River. [June 12, '15.]

St. Clair, Pa.—The Eastern Pennsylvania Railways and the Schuylkill Electric Railway have received a franchise to construct an electric railway in St. Clair, which will connect the southern part with the northern part of Schuylkill County.

TRACK AND ROADWAY

Little Rock Railway & Electric Company, Little Rock, Ark.—Plans are being made to widen and strengthen the bridge across the Arkansas River so as to enable it to carry street car traffic. The cost of reconstruction will be about $290,000, of which the county will pay $100,000, the railway $100,000 and the Main Street property owners $90,000.

Eureka, Cal.—Surveys have been begun on the proposed railway from Eureka to Klamath Falls, Ore., and it is expected that construction will be begun soon. [Feb. 27, '15.]

Pacific Electric Railway, Los Angeles, Cal.—Work has been begun by this company reconstructing its track on American Avenue, Long Beach, from Sixth Street to Anaheim Street.

San Francisco-Oakland Terminal Railways, San Francisco, Cal.—This company will be asked by the West Berkeley Improvement Club to extend its Sixth Street line from University Avenue north to the town line.

Santa Barbara & Suburban Railroad, Santa Barbara, Cal.—Work has been begun on the 2600-ft. extension planned by this company on the "Riviera." The Municipal Improvement Company has been awarded the contract, which includes the first 900 ft.

Connecticut Company, New Haven, Conn.—Work will be begun at once by this company laying new track on East Main Street from Broad Street to the city line and on West Main Street from Maple Street to the city line in Meriden. The company will use 80-lb. rail on East Main Street and 95-lb. rail on West Main Street.

Wilmington & Philadelphia Traction Company, Wilmington, Del.—Material has been received and work will soon be begun on the extension of this company's Washington Street line to Concord Avenue and the Boulevard.

Idaho Railway, Light & Power Company, Boise, Idaho.—The properties of this company have been purchased by the Electric Investment Company.

Urbana & Champaign Railway, Gas & Electric Company, Champaign, Ill.—This company is improving its park and fair ground line, lowering the tracks to a new street pavement level, placing a modern curve at the east end of the park and building a new bridge over a small stream.

East St. Louis & Suburban Railway, East St. Louis, Ill.—Operation has been begun on the extension of this company's Lansdowne Avenue line from Twenty-fifth Street and Lynch Avenue to Jones Park, St. Louis.

Pekin (Ill.) Municipal Railway.—Operation has been begun on the Court Street line of this railway. [Nov. 21, '15.]

Evansville (Ind.) Railways.—Operation was begun on July 4 on the Bellemeade extension of this company's line.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—This company will lay new track on State Boulevard, Fort Wayne, and will move the track in front of the Indiana Home for Feeble Minded Youth from the north side to the south side of the street. Preparations are being made for the paving of State Boulevard. The company will expend $20,000 on these improvements.

Fort Dodge, Des Moines & Southern Railroads, Boone, Iowa.—This company has purchased its own right-of-way into Des Moines and construction will be begun at once. The company has acquired a strip of land from Swanwood, 1 mile north of the city limits, to Brooks Street, East Des Moines.

Worcester & Warren Street Railway, Worcester, Mass.—The Council of West Brookfield has ordered this company to relocate its tracks on West Main Street to meet the requirements of the town.

Hannibal Railway & Electric Company, Hannibal, Mo.—Work has been begun by this company relaying its tracks on South Maple Avenue from Broadway to Lyon Street, Hannibal, with 70-lb. rails.

Reno (Nev.) Traction Company.—Work has been begun by this company on an extension of its line from Fourth Street to the race track. The branch will not be a permanent line but will be constructed to take care of the heavy traffic during the race meet.

International Railway, Buffalo, N. Y.—Announcement has been made that work on the tracks of this company in Allen Street and Virginia Street for the Connecticut Belt and Hoyt Street car service will be completed within a short time. New rails have been laid, switches installed and the pavement repaired. About $10,000 is being spent on this undertaking. New track is also to be laid in various parts of the city and a considerable amount of paving work is being done.

New York State Railway, Rochester, N. Y.—The Public Service Commission for the second district of New York has approved the extension of this company's lines from Rochester to Greece to connect the company's tracks with a loop crossing Dewey Avenue, Greece, and crossing the tracks of the Kodak branch of the New York Central Railroad. The tracks will be built for about 1800 ft. from the present terminus of the lines to Little Ridge Road, connect with the Dewey Avenue extension and thence extend by a loop back to the south-bound tracks as now existing. The tracks will run through the center of Dewey Avenue, and will cross at grade Knickerbocker Avenue, Avis Avenue, Pullman Avenue, Steko Street and Palm Street and the tracks of the Kodak branch of the New York Central Railroad.

New York State Railways, Syracuse, N. Y.—This company plans to expend $200,000 for trackage improvements in Syracuse.

Black River Traction Company, Watertown, N. Y.—This company will lay new double track on its line on lower State Street, Watertown. Wooden ties and stone ballast will be used.

Piedmont Railway & Electric Company, Burlington, N. C.—It is reported that this company may extend its lines to Elon College.

East Village & Harbor Traction Company, Ashtabula, Ohio.—Surveys will be begun at once of this company's proposed line in Ashtabula. In connection with the road a steel and concrete bridge will be constructed across the Ashtabula River at the foot of Main Street. Mark E. Copeland, Cleveland, is interested. [Sept. 19, '14.]

***Cincinnati, Ohio.**—Plans are being considered for the formation of a new interurban traction corporation, its object being to furnish an entrance into Cincinnati for the Cincinnati, Lawrenceburg & Aurora Electric Street Railroad. The distance between Anderson's Ferry, the present terminus of the interurban line, and Third and Walnut Streets is about six miles and it is estimated that the cost of the road will be about $700,000.

Lake Shore Electric Railway, Cleveland, Ohio.—Work has been begun by this company reconstructing its tracks from the Big Four Railway tracks in Urbana to Crystal Lake Park. The tracks will be lowered from 2 ft. to 3 ft. and a more modern curve put in entering the park.

Oakwood Street Railway, Dayton, Ohio.—One of the tracks being constructed by this company has been completed and work is being begun on the other. The line extends about ¾ mile beyond the present Oakwood railway terminus. It is expected that the road will be completed and ready for operation about Aug. 1.

Springfield (Ohio) Railway.—This company has agreed to remove its feed wires from the trolley poles in Main Street between Grape Alley and Wittenberg Avenue so as to free the street from overhead obstruction. The feed wires will be placed in the alleys and across the streets in conduits.

***Henryetta, Okla.**—Plans are being considered to construct an electric railway from Henryetta to Dewar, 3 miles. Gen. Z. T. Sweeney, Columbus, Ind., is interested.

***Ephrata, Pa.**—A movement is being agitated for an electric railway from Sinking Spring via Denver, to Ephrata, where it will connect with lines operating to Lancaster and Lebanon, and at Sinking Spring with a line to Reading. Many landowners are willing to give the right-of-way.

Cleveland & Erie Railway, Girard, Pa.—A report from this company states that it is installing a sample lot of welded splice bars purchased from the Indianapolis Switch & Frog Company to be used in connection with 60-lb. A.S.C.E. rail in paved streets.

Houston, Richmond & Western Traction Company, Houston, Tex.—This company has awarded a contract to the Federal Bridge Company, Des Moines, Iowa, at $56,000 to construct a bridge over the Brazos River. This is in connection with the company's proposed 30-mile railway from Houston to Richmond. E. Kennedy, Houston, is interested. [June 12, '15.]

Ogden, Logan & Idaho Railway, Ogden, Utah.—Announcement has been made that this company will build a new line from Ogden to Brigham City, taking a shorter route than the present one and tapping a new territory. Surveys have been completed and right-of-way is being secured. Construction has been practically completed on the company's extension to Huntsville.

Salt Lake & Utah Railroad, Salt Lake City, Utah.—A report from this company states that the contract has been awarded for grading and material purchased for an extension of its lines from Springville to Spanish Fork, 6 miles. Work has been begun.

Ohio Valley Electric Railway, Huntington, W. Va.—A contract has been awarded to the Brubaker Construction Company for the construction of an extension of this company's line on Twelfth Avenue, Huntington.

SHOPS AND BUILDINGS

Aurora, Elgin & Chicago Railroad, Wheaton, Ill.—This company announces that about Aug. 1 it will move its general offices from Wheaton to the Hotel Arthur Building, Aurora, Ill. The general offices will occupy the sixth floor and a part of the fifth floor, and the first floor of the building will be used as an interurban passenger station. All the interurban cars entering Aurora will receive and discharge their passengers at this point. These include the Aurora, Elgin & Chicago Railroad, the Joliet, Plainfield & Aurora Railway and the Chicago, Aurora & DeKalb Railroad.

Cleveland (Ohio) Railway.—Application has been made by this company to the building department for a permit to construct three buildings and a reservoir at Denison Avenue. W. I. Thompson & Son Company has the contract. An office building two stories high and a repair shop are included in the improvements, as well as a boiler and pump house. The cost is estimated at $84,500.

Corpus Christi Railway & Light Company, Corpus Christi, Tex.—This company reports that plans are being made to construct a new carhouse at Corpus Christi with a capacity for fourteen cars.

Milwaukee Northern Railway, Milwaukee, Wis.—This company has completed its new $25,000 station on Fifth Street between Wells Street and Cedar Street, Milwaukee. The structure is 70 ft. x 40 ft., one story with basement. The building is of brick, concrete and tile and the interior is finished in tile and quarter-sawed oak.

POWER HOUSES AND SUBSTATIONS

Pacific Electric Railway, Los Angeles, Cal.—This company advises that it is installing two 200-kw. motor-generator sets in its new substation at Corona, which is the terminus of a short line running from Riverside to Corona. It is estimated that the cost of the plant will be about $20,000.

Hutchinson (Kan.)—Interurban Railway.—This company has purchased a double equipment of Westinghouse 35-hp. railway motors.

Vicksburg Light & Traction Company, Vicksburg, Miss.—A report from this company states that it has recently purchased a new 500-hp. Heine boiler to be equipped with Green chain grate stoker to replace two 250-hp. Stirling boilers equipped with Murphy stokers. The installation will be made about Sept. 1, at its plant in Vicksburg.

St. Louis, Mo.—Morrison & McCall, purchasing agents, Chemical Building, report that they have ordered five 125-kw. Allis-Chalmers oil engines complete with exciters and d.c. generators for use on various electric railway properties controlled by them.

Toledo Railways & Light Company, Toledo, Ohio.—Plans are being made by this company to build an addition to its power plant at Water Street. It is estimated that the cost will be $2,700.

Manufactures and Supplies

ROLLING STOCK

Dayton & Troy Electric Railway, Dayton, Ohio, is rebuilding a car in its shops.

Toledo & Western Railroad, Toledo, Ohio, has ordered one 60-ton electric locomotive and one steel-body package freight car.

Boston (Mass.) Elevated Railway has ordered three two-way dump cars from the Universal Car & Manufacturing Company, New York, N. Y.

Morrison & McCall, St. Louis, Mo., purchasing agents, located in the Chemical Building, expect to purchase possibly five extremely light cars for their various properties.

Fort Dodge, Des Moines & Southern Railway, Boone, Iowa, will receive two new passenger cars on July 31. One car, which has a side entrance, is for the Boone-Ames line; the other, a larger car, is for the main line traffic between Fort Dodge and Des Moines.

Ogden, Logan & Idaho Railway, Ogden, Utah, noted in the ELECTRIC RAILWAY JOURNAL of March 20 as having ordered one 50-ton Baldwin-Westinghouse electric locomotive, is reported as having ordered an additional locomotive of the same type, to be put into service on Nov. 1.

TRADE NOTES

Standard Paint Company, New York, N. Y., has received a gold medal at the Panama-Pacific Exposition for its cement waterproofing compound, "Impervite."

I. R. Nelson's Electrical Manufacturing & Repair Works, Newark, N. J., has appointed A. M. Leacock to represent this company in the electric railway field. Mr. Leacock has had extensive experience in the manufacture of field and armature coils, both in electric railway repair shops and with manufacturing concerns. He recently resigned as superintendent of the Electric Operations Company, Inc., where he had complete charge of the field coil department.

Electric Specialties Company, North East, Pa., has been formed for the purpose of manufacturing electric machinery and repair parts, such as commutators, trolley wheels, line material, copper, bronze and brass castings, and drop forgings in copper and steel. The plant at North East is of brick and steel construction and occupies 15,000 sq. ft. of floor space. The officers of the company are: President, G. E. Pierce; vice-president, F. B. Moorhead; treasurer, O. C. Hirtzel; secretary, N. P. Fuller.

O. T. Hirtzel, who severed his connections with the Westinghouse Electric & Manufacturing Company on Feb. 1 has been appointed treasurer of the Electric Specialties Company, North East, Pa., a new corporation described elsewhere on this page. Mr. Hirtzel has been with the Westinghouse Company since 1912 as railway supply specialist of the detail and supply department at East Pittsburgh. Prior to that he was treasurer and manager of the Eureka Company, formerly the Eureka Tempered Copper Works, since the formation of that corporation nearly twenty years ago.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has received an order to equip with No. 307-V four-motor equipments and control the six cars recently ordered by the New York & Long Island Traction Company. Except for the fact that the new motors will be of the ventilated type they will be duplicates of the No. 307 motors now in service and therefore will enable the mechanical department of this company to benefit by the interchangeability of parts of the new with the old motors. The Westinghouse company has also received an order for ten a.c. two-motor equipments which are duplicates of the present No. 409 motors.

Archbold-Brady Company, Syracuse, N. Y., reports the sale of structural-steel towers for 28 miles of transmission line to be built by the Iowa Railway & Light Company, Cedar Rapids, Iowa, between Blairstown and Tama, Iowa. This will be a 66,000-volt, single-circuit, three-phase transmission line on suspension-type insulators. 48-ft. A-frame towers constructed on 440-ft. standard spans with lace-channel poles at special locations and square towers for anchoring line ends and at heavy angles will be used. The transmission line will be steel-reinforced aluminum with steel ground wires. This order was placed by S. C. Dows, purchasing agent, and J. M. Drabelle, electrical engineer.

ADVERTISING LITERATURE

Drew Electric & Manufacturing Company, Indianapolis, Ind., has issued a folder describing its new cable insulator and splicing sleeve for underground cables. When used as an insulator in the cable sheath, this insulator, it is said, will destroy the conductivity of the sheath by dividing it into short sections and prevent it from collecting current from earth and underground structures. When used as a splicing sleeve it eliminates the danger of leakage at the splice, as the insulator will stand up against any voltage.

Lincoln Electric Company, Cleveland, Ohio, has issued a booklet on the subject of electric arc welding. This gives an excellent description of the principles involved in welding of all kinds and devotes special attention to autogenous welding with the electric arc, an analysis being made of the cost involved, both for labor and for power to produce the arc. Detailed accounts of the methods of welding various pieces of apparatus are included, together with a description of the Lincoln arc welder which is manufactured by this company.

Mitchell-Rand Manufacturing Company, New York, N. Y., manufacturer of all kinds of wax, pitch and asphalt compositions, has issued a folder describing the Columbia or "drop" method and the Kraemer and Sarnow method for testing the melting point of these substances. The difficulty in taking the melting point of such materials as mentioned above, which do not crystallize on solidifying, is the fact that there is no line of demarcation between its solid state and its liquid state. This company has endeavored, therefore, to standardize its tests so that a desirable uniformity on the various products is maintained and the user will have a standard on which to base comparisons. The folder illustrates the apparatus and describes the methods for ascertaining melting points in a way which would make recourse to a chemist or a technical expert unnecessary.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has just issued a booklet entitled "Results of Electrification" in which the history of electric operation on steam railroads is outlined briefly, descriptions of a number of the more important electrified lines being given. These descriptions are grouped under general headings covering installations for tunnels, terminals, trunk lines, mountain grades, switching service and for railroads having relatively light traffic, such as is found on the larger interurban systems. The booklet is elaborately illustrated and contains a number of tables covering important data upon the various systems described. It concludes with an interesting diagram showing the cumulative shipments of electric locomotives on a tonnage basis by the Westinghouse Electric & Manufacturing Company from 1905 to 1914, the curve showing a comparatively steady increase from an insignificant total in 1905 to approximately 24,000 tons in 1914.

COMPANY MAY NOT ABANDON LINE

The Public Service Commission for the Second District of New York has refused to permit the Empire United Railways to abandon its line from Oswego to Seneca Hill on the east side of the Oswego River. The application is the second which the company has made to the commission since it constructed its line through Minetto to Oswego on the west side of the river. Though Commissioner Irvine finds that the population along the east side of the river is not sufficient to make the operation of the line pay, it is decided that the road should be operated for the accommodation of the residents of Seneca Hill until the proposed bridge across the river from Seneca Hill to Minetto is completed. The order of the commission suggests that the cars might be operated at a forty-minute headway or less the year round. The company receives permission to renew the application as soon as the new Minetto bridge is completed, as at that time the residents of Seneca Hill can be as readily accommodated on the west side line as on the present east side line.

Little Mary had cramps. So did her little brother Willie. The doctor's prescription saved Mary but they didn't think of treating Willie the same way—and he is no longer with them.

Maybe you think such things aren't done among electric railway men. Perhaps you are right. And, again, perhaps it's no more illogical and thoughtless than some things that are done.

For example, we know of several roads that have put *Peacock Brakes* on three-quarters of their cars.

"Best Brakes made" they tell us. "Yes, we've tested them. The Peacock will stop our heaviest cars. Never give us any trouble"—in short, the Peacock cures all their brake troubles—on three-quarters of their cars. It cures little Mary.

But little Willie, the other 25 per cent of their rolling stock, goes right on suffering and on account of the high cost of poor braking their car investment, like little Willie, will soon no longer be with them.

Isn't it inconsistent to find a brake that saves real money and then not to put it to work on all the cars?

Especially these days when nickels are so small?

Why, in the name of plain business sense, isn't it a plain duty to rip out the inefficient, unsafe and actually costly old staff brakes? Rip 'em out by the roots and scrap 'em—and to put Peacocks in their place—just as they were put in on the other cars.

And by the way—you aren't overlooking little Willie, are you? Peacocks are saving money on some of your cars. How about the others.

Again, by the way—we can quote a little more closely now and give you better service now than we can after the Fall rush is upon us. A word to the Wise is unnecessary.

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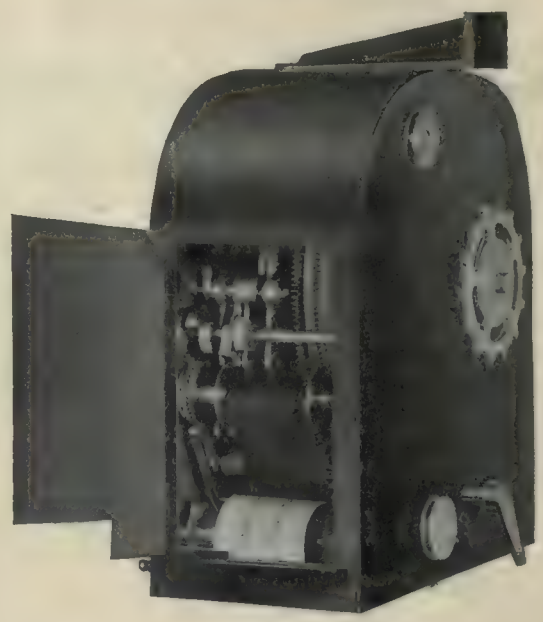

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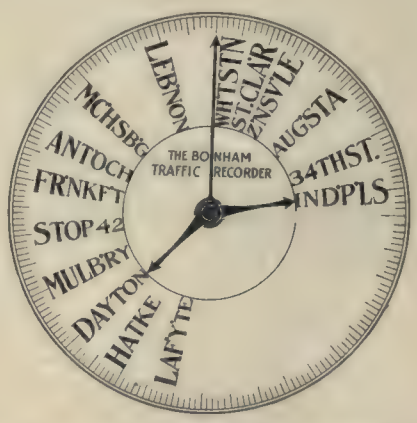

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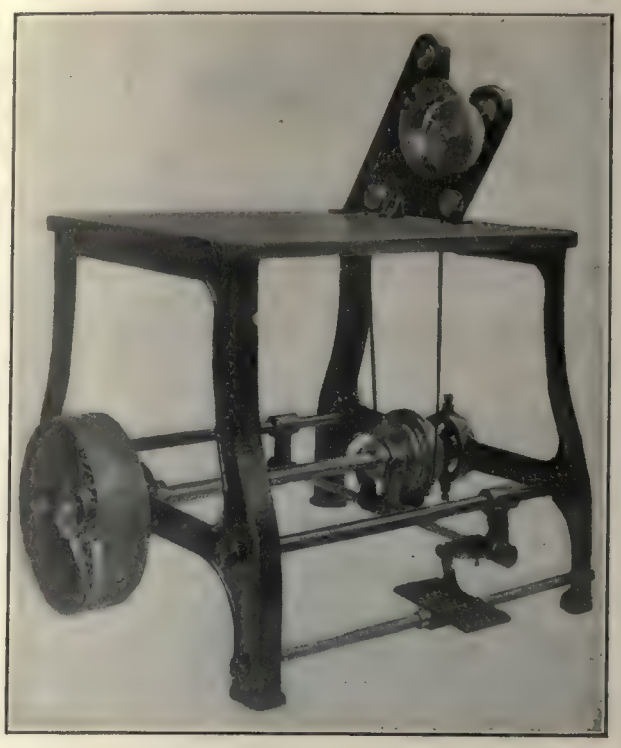

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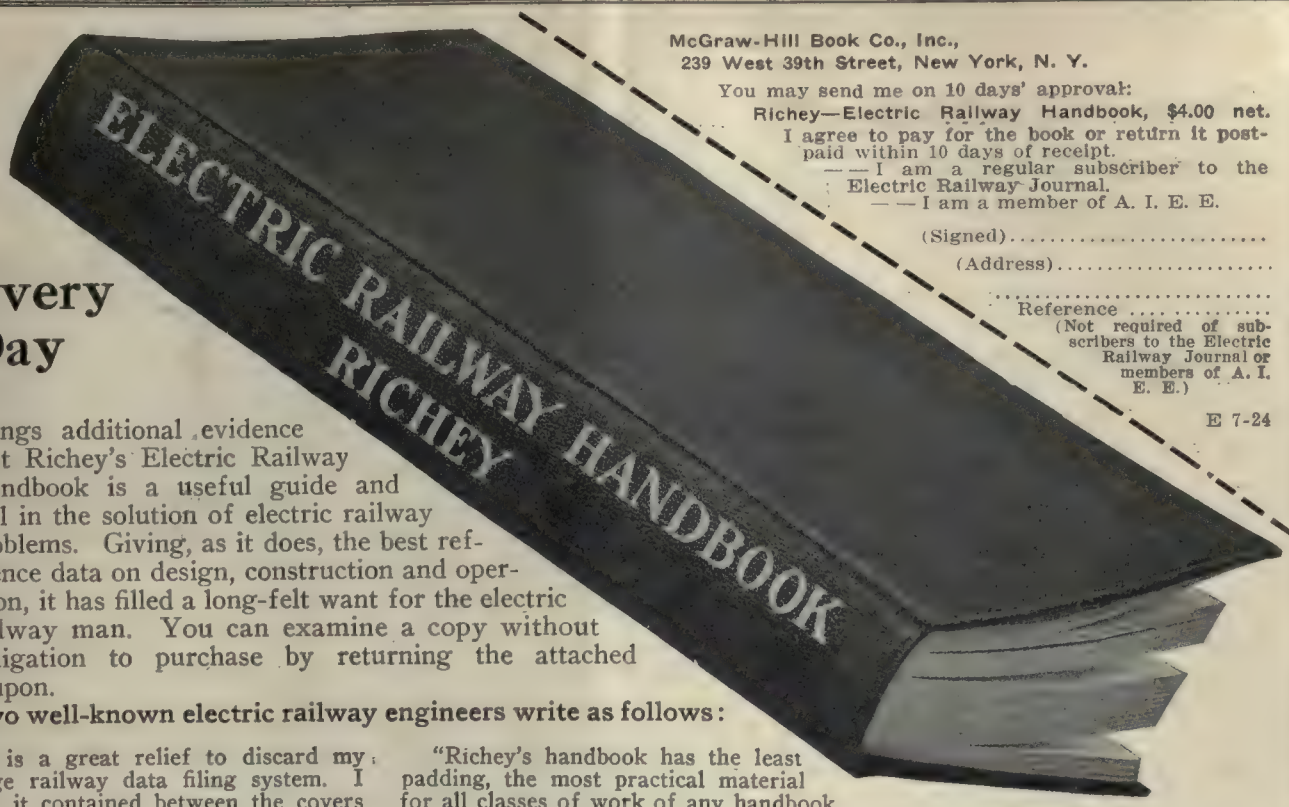

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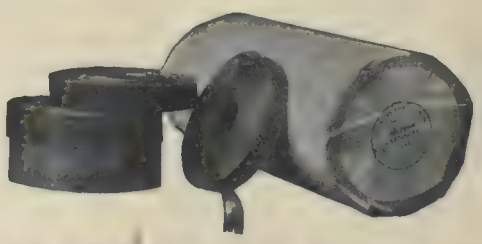

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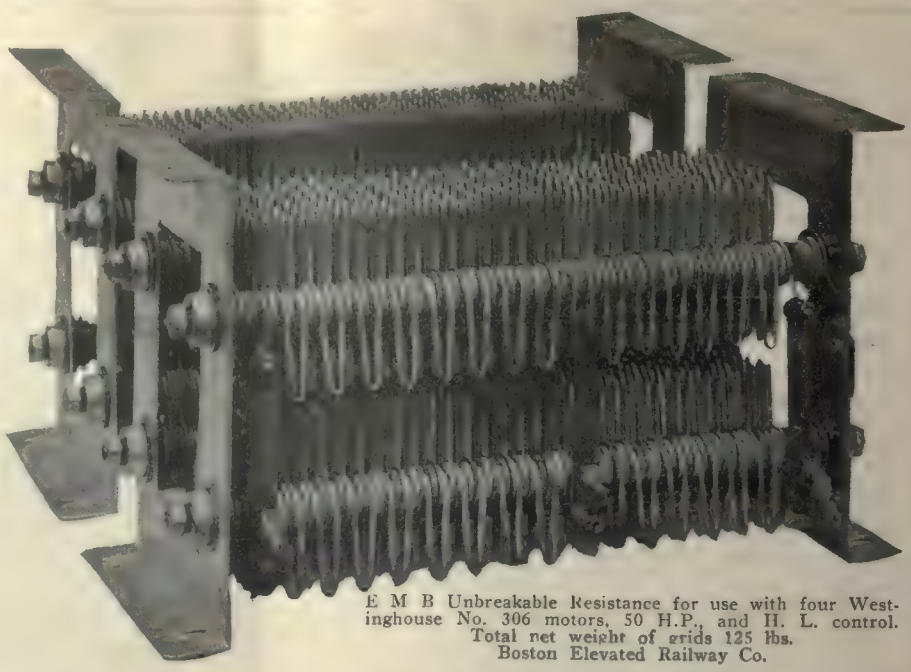

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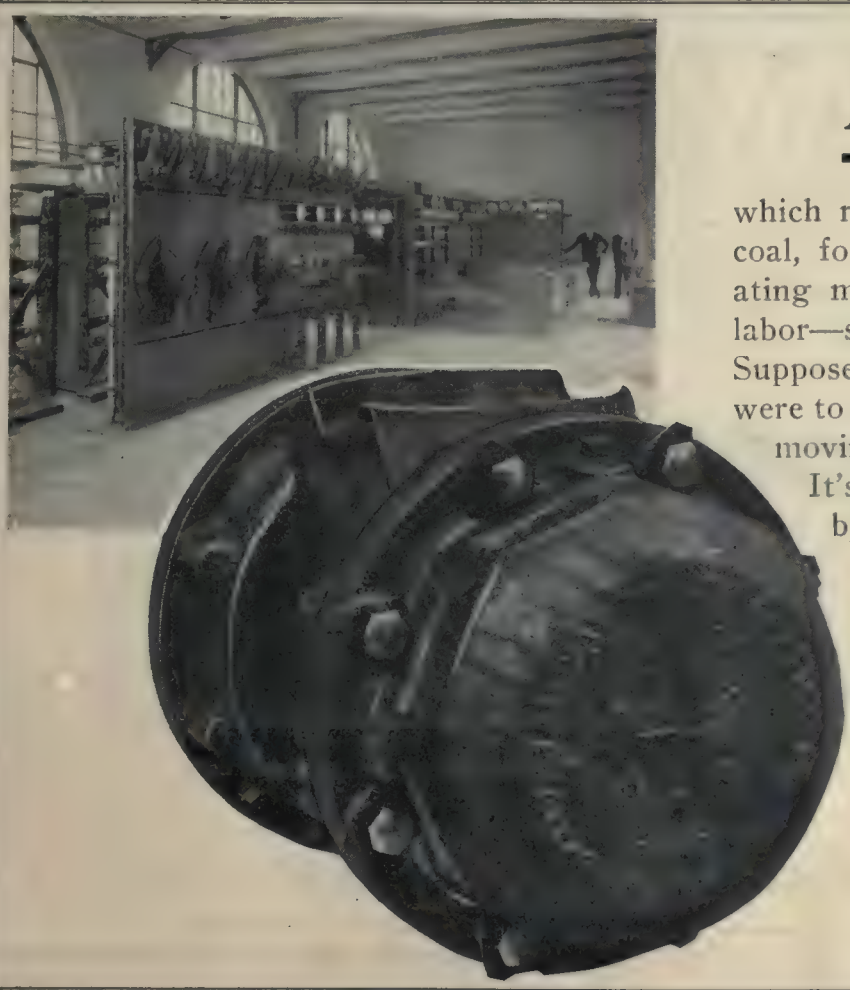

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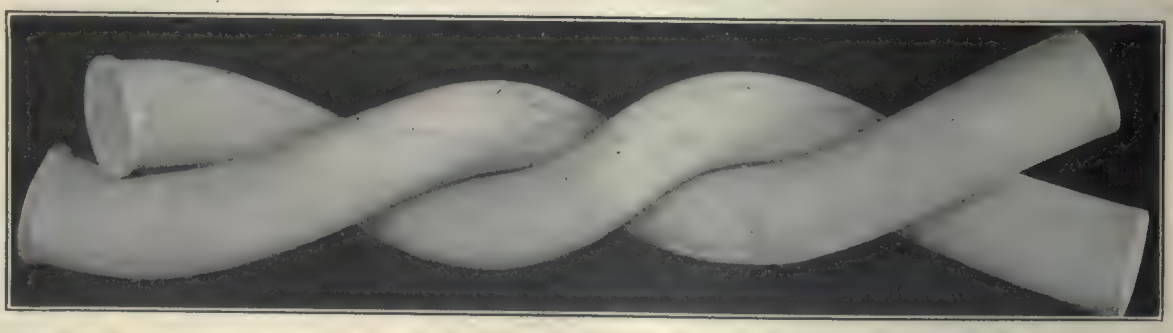

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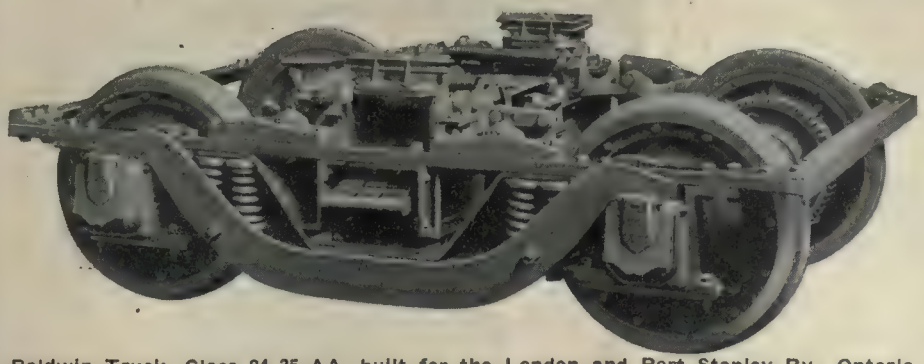

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They are decidedly "cars of character."
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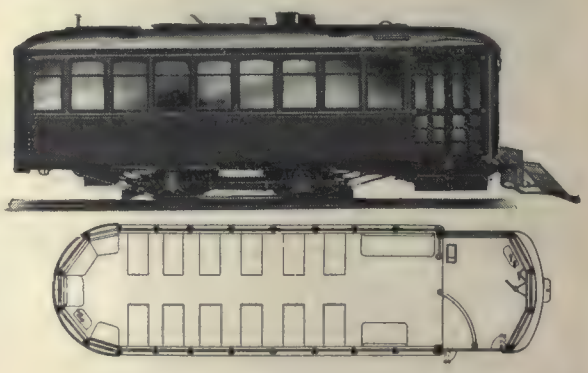

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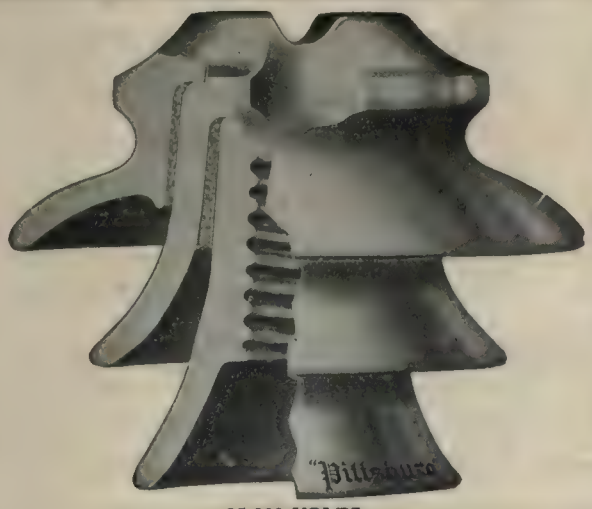

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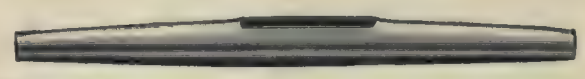

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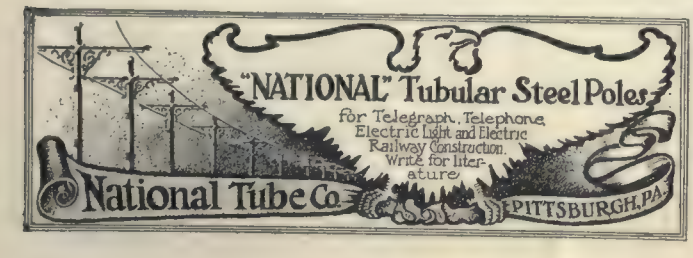

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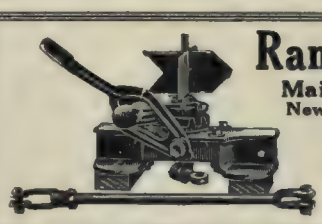

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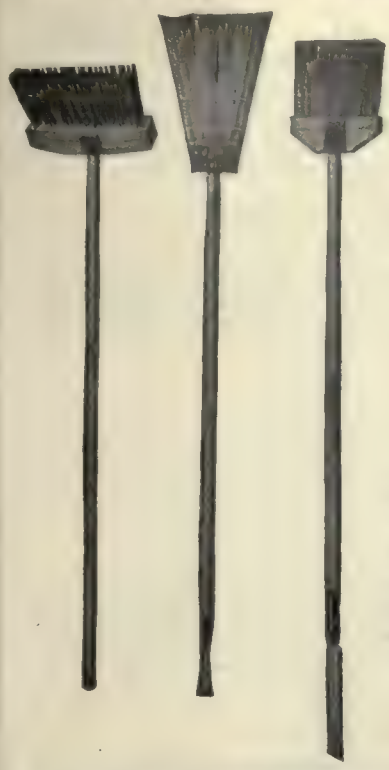

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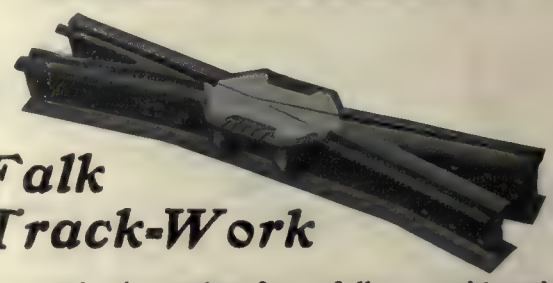

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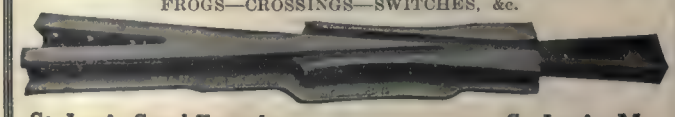

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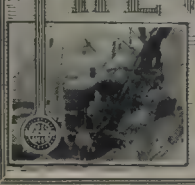

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ANY MAN who can fire a boiler and obtain as high an efficiency as the Murphy is worth more money to you in some other department.

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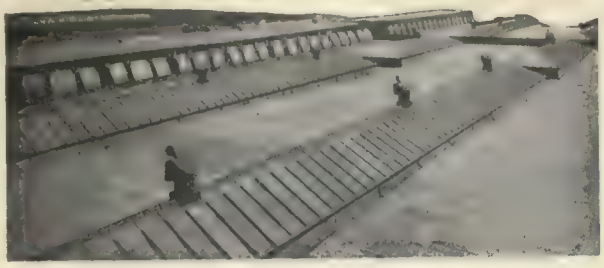

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Full Power with High or Lower Adjustment

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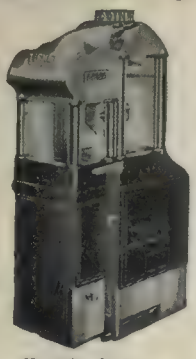

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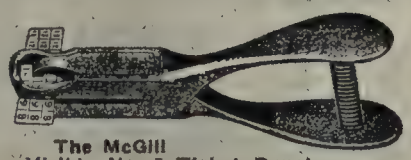
This Is the Punch for Rapid Handling of Transfers



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When the platform of a car is crowded with entering passengers every second lost in fare collection counts heavily. "Blind" punches and punches that "stick" cost considerable loss of time in punching transfers. Equip your conductors with the McGill Visible No. 5 and note the difference. Samples sent for inspection and trial. Write for Catalog 25 J.

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They needed a register that would receive and register the tickets separately from the coins.

There was nothing in the market like it anywhere.

They came to us.

They got it.

We designed to suit their needs.

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The delays have disappeared, as those having their fares ready pass the ones buying tickets and drop their fares into the hopper.

They have secured also the great advantages of mechanical registration.

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Light Weight Steel Seats

save the drain on current at "traffic peaks."

WALKOVER Pressed Steel Seats

give more room—more comfort—more money value than any other seat. *Specify them for your new cars.*

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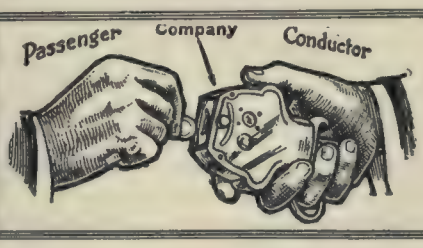

Direct Automatic Registration By the Passenger

Rooke Automatic Register Co.
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MASON SAFETY TREADS—prevent slipping and thus obviate damage suits.
KARBOLITH CAR FLOORING—for steel cars is sanitary, fireproof and light in weight.
STANWOOD STEPS—are non-slipping and self-cleaning.
Above products are used on all leading Railroads. For details address
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SPECIAL shade rollers for cars, that will last and give satisfaction for years, and yet cost but little more than the poorest you can buy, are made by the Stewart Hartshorn Co., E. Newark, N. J. This company is by far the largest shade roller manufacturer in the world. It is able to give high quality at lower prices because of the enormous output. Write for catalog, stating wants. You are always protected, when you buy shade rollers, if they bear the signature, Stewart Hartshorn

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Universal Safety Tread
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Proceed in Safety.
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Be Careful

Universal Safety Tread Co., Waltham, Mass.

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have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

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it's a *ventilated* car. Fine design on perfect ventilating principles at surprisingly low cost. "Globe" for Air Comfort.

Globe Ventilator Co., Troy, N. Y.

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Self Lubricating
A reliable wheel built for service and economy.
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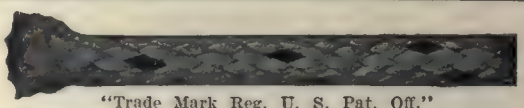
AUTOMATIC VENTILATOR CO., Sales Agent,
2 Rector St., New York City



"Trade Mark Reg. U. S. Pat. Off."
Samson Spot Waterproofed Trolley Cord
Made of fine cotton yarn braided hard and smooth. Inspected and guaranteed free from flaws. Proved to be the most durable and economical. Samples and information gladly sent.
1 SAMSON CORDAGE WORKS, BOSTON, MASS.

The Peter Smith Heater Company's Forced Ventilation Hot Air Heaters are approved by the Board of Underwriters', also they are protected with patents in United States and Canada. Catalogue and detail data will be furnished you upon request.

THE PETER SMITH HEATER COMPANY
1735 Mt. Elliott Ave., Detroit, Mich.

The Eclipse Railway Supply Co.
CLEVELAND, OHIO

Manufacturers of the

ECLIPSE LIFE GUARD — ECLIPSE WHEELGUARD
ECLIPSE TROLLEY RETRIEVER — ACME FENDER

Ventilation—Sanitation—Economy—Safety

All Combined in

THE COOPER FORCED VENTILATION HOT AIR HEATER

Patented September 30, 1913. Ask for the full story.

We Also Manufacture Pressed Steel Hot Water Heaters

THE COOPER HEATER CO., CARLISLE, PA.

G. C. REITER, CANTON, O.

Manufacturer of

Car Gongs of all kinds

Rotary and Single Tap Gongs

Philip Nungesser

Now Let Us Prove It To You

We have proved the month in and month out serviceability of

Nungesser
Carbon and Metallic Brushes

to many others in all lines of industry.

Will you match your time against our time and expense to either correct any brush troubles you may have, or to improve present conditions?

If Better Service interests you, write us for Symptom Blanks.

The Nungesser Carbon & Battery Co.
Cleveland, Ohio

W. J. Jeandron

173 Fulton St.
New York City

Pittsburgh Office:
636 Wabash Building,
W. P. Poynton, Engineer

Chicago Office:
1657 Monadnock Block,
J. C. Kyle, Engineer

Le Carbone brushes are demanded by those who know all the effects of carbon brushes on yearly maintenance cost. Efficient—Uniform.

LE CARBONE
"the Reliable Brush"

The famous men of the electric railway field contribute the benefit of their experience to the

ELECTRIC RAILWAY JOURNAL

TULC

ANOTHER RESULT

A car with 2 GE 1000 motors made 3020 miles in 23 days on 5 gills of TULC on motor bearings. Figure this cost out and compare it with your cost.

THE UNIVERSAL LUBRICATING CO.
Schofield Building CLEVELAND, O.

DISFICO

IMMEDIATE DELIVERY ON
Fibre Track Insulation

Order from our Chicago or Elsmere factory, whichever is nearer, and delivery will be made without delay.
Include an order for Disfico Horn Insulation for repair work.

DIAMOND STATE FIBRE CO.
Elsmere, Del. Chicago, Ill.

ALEBAUGH
No Spark Brushes

Save Commutators, Power, Brush Cost

ALEBAUGH SELF LUBRICATING CARBON COMPANY
1502 Columbia Ave. Phila., Pa.

Don't Delay

Preserve Your Car Roofs and Headlinings with Bayonne Car Roofing
A specially prepared canvas roofing
Permanent—Economical

John Boyle & Co., Inc., 112 Duane St., New York
Branch House: 202-204 Market St., St. Louis, Mo. 2

"Modern Railway Appliances of Merit"
Manganese Bronze Check Plates
Journal, Motor, Armature and Axle Bearings
Col-R-Ol Curtain and Hand Strap Renovator
Air Brake and Controller Handles with Steel Tube Bushings
Quick-Action, Adjustable Motorman's Seat
Flower Brush Holders, Ticket Punches
Rebushing old Controller and Air Handles
Let us send you details

Railway Specialties Corporation
Columbia Building, 29 Broadway, New York, N Y.

SAFETY FIRST ECONOMY renewable cartridge FUSES

SAFETY FIRST—ECONOMY NEXT

Non-renewable fuses are an expense. A good, renewable fuse is an investment.
The only good Renewable Fuse on the market is marked "Economy"

Write for Catolog No. 2 and Bulletin

ECONOMY FUSE & MFG. COMPANY, KINZIE AND ORLEANS STS., CHICAGO

Van Dorn Radial M. C. B. Coupler—with Pivoting Head

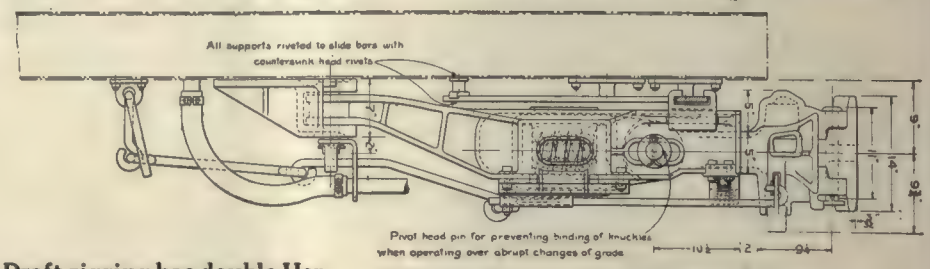
Has extended guard arm and butting wall. Prevents buckling in coupling and in train operation.

Pivoting head (M. C. B. type) prevents binding on severe changes in grade.

Head has deep knuckles which permit wide vertical movement.

Radial carrier eliminates binding even on 30 foot radius curve.

Uncouples from side of car.



Draft rigging has double Hercules springs which effectively absorb impact shocks. Anchors close to sills give strong anchorage and proper clearance.

Write for blueprints and additional information

Van Dorn Coupler Company
2325 So. Paulina St., Chicago, Ill.

Heat Treated Motor Gearing

No. 1

Guaranteed Life Ratio

Gears

On the assumption of 30,000 miles per year a Cast Steel Gear will last 3½ years, a "B P," 11⅔ years, and a Case Hardened 16⅔ years.

Grade Gears	Trade-mark	Carbon Content	Relative Life
Standard cast steel, untreated.....	CS	Med.	1.00
Forged steel, special process, solid.....	BP	Med.	3.50
Case hardened, solid.	CH	Low	5.00
Pinions			
Nuttall Standard.....	NS	Med.	1.25
Special Process.....	BP	Med.	3.50
Case Hardened.....	CH	Low	5.00

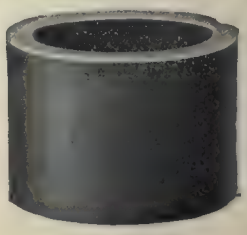
Write

For further particulars on gears to meet your service conditions.

Nuttall - Pittsburgh

LONGWEAR BUSHINGS

Hardened
Steel
Accurate
Uniform



Dimensions
Exactly
as
You Specify

E.G.Long Company

50 Church Street New York

BRAKE SHOES

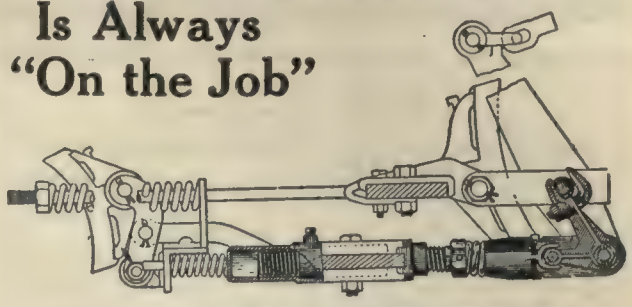
The "Show Me" Spirit Is a Good Sign

The spirit of today is *"show me"* — and the reputable and successful company has to *show 'em.*

We've followed the policy of "showing" the electric railway industry good brake shoe service ever since we started in the business. *Service* is the keynote of our business. The records of roads which use our service brake shoes back up these statements. Get the data.

American Brake Shoe & Foundry Co.
MAHWAH, N. J.
30 Church St., New York McCormick Bldg., Chicago
71609 2

Needs Little Attention Is Always "On the Job"



The ANDERSON
AUTOMATIC SLACK ADJUSTER

Fifteen minutes is all the time necessary for installing this adjuster, there being no changes in the brake rigging. When once installed it requires no further attention but performs its function automatically.

Increases wheel mileage and reduces wear on shoes. Insures maximum efficiency and positive working of brakes. Decreases labor costs by cutting down inspection and repairs.

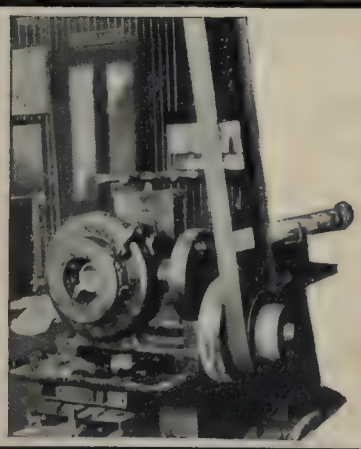
Write for our new price schedule and trial proposition. You'll find it worth while.

Anderson Brake Adjuster Co.
OMAHA, NEB.
William R. Garton, Sales Engr., 299 Broadway, N. Y.
Grayson Railway Supply Co., Southwestern Rep., St. Louis, Mo.
1

July 13, 1915.

OUR Brake Engineering Service goes farther than simply furnishing S-W-B Slack Adjusters to our customers, which care for their shoe and wheel wear. We endeavor to suggest such arrangements of levers and pressures, etc., as will give the most efficient brake service under the specific and peculiar conditions of each locality and service. This we will gladly do for you, whether customers or not. May we be of service?

SMITH-WARD BRAKE COMPANY, INC.,
(This corporate name was formerly Sauvage-Ward Brake Company, Inc.)
Whitehall Bldg., New York.



"Only two sets of dies in five years—"

writes the user of the machine shown at the left—a remarkable record but one which shows the quality that is built into every detail of

OSTER PIPE-THREADING MACHINES

That testimony should interest you as it comes from a railroad shop. By glancing through the catalog at the right you will find a machine exactly fitted to your particular needs. There's a dealer near to show you the tool. *To get catalog use coupon or post card today.*

THE OSTER MFG. CO.
2087 East 61st St., Cleveland, O., U. S. A.

Please send catalog and dealer's name to

Name.....
Company.....
Address.....
City.....State.....
(2087)

SEARCHLIGHT SECTION

FOR SALE

2—28′ 10″ Paywithin Cars, 4 G.E. 80 motors, Brill 27 G Trucks, AA1 Air Brakes.
1—Double Truck Sprinkling Car, 4,000 gallons capacity.
30—Brill 20′ Closed Cars, G.E. 1000 M., Brill 21-E Tr.
20—Jones 20′ Closed Cars, G.E. 52 Motors, Bemis Trucks.
2—Jackson and Sharp 18′ Car Bodies.
10—42′ Kuhlman Int. Cars, Bald. Tr., 4 Wgh. 121 Motors.
20—Comb. Int. Cars, Bald. Trucks, 4 Wgh. 119 Motors.
8—Brill 22′ Closed Cars, Wgh. 68 Motors, Peck. Trucks.
1—Jackson and Sharp 18′ Car Body.
4—Brill 30′ Express Cars, Brill 22-E Trucks.
9—Brill 30′ Express Cars, complete, 4 G.E. 1000 Motors, AA1 Air Brakes, Brill 27-G Trucks.
10—Wason 10 B. Open Cars, G.E. 1000 Motors, Bemis Tr.
5—Brill 10 B. Open Cars, West 12A M., Brill 21-E Trucks.
8—Brill 14 B. Open Cars, Wgh. 56 Motors, Brill 22-E Tr.
8—West. 101B-2 Railway Motors, complete.
40—G.E. 90 Railway Motors, complete.
20—G.E. 66 Railway Motors, complete.
103—G.E. 88-B brand new Motors, complete.
12—G.E. 73 Railway Motors, complete.
24—G.E. 87 Railway Motors, complete.
20—G.E. 57 Railway Motors, complete.
20—G.E. 80 Railway Motors, complete.
12—G.E. 54 Railway Motors, complete.
60—G.E. 1000 Railway Motors, complete.
60—G.E. 800 Railway Motors, complete.
30—West. 12A Railway Motors, complete.
32—West. 49 Railway Motors, complete.
8—West. 38B Railway Motors, complete.
10—West. 112 Railway Motors, complete.
4—West. 68-C Railway Motors, complete.
4—West. 68 Railway Motors, complete.
22—G.E. 80 Armatures, brand new.
2—G.E. 87 Armatures, brand new.
2—G.E. 73-C Armatures, brand new.
4—G.E. 67 Armatures, brand new.
18—G.E. 57 Armatures (second-hand), two turn.
30—G.E. 57 Form A Motor Casings.
3—West. 101-B2 Armatures, brand new.
3—West. 93A-2 Armatures, brand new.
3—West. 93A Armatures, brand new.
22—K6 Controllers. 62—K10 Controllers.
44—K11 Controllers. 30—K14 Controllers.
28—K2 Controllers. 28—B29 Controllers.
2—Sets Brill 27G Trucks, 4′ 6″ wheelbase.
6—Brill 21E Trucks, 7′ 6″ and 8′ wheelbase.
10—Dupont Trucks, 7′ 6″ wheelbase.

All of the above apparatus is in first class condition for immediate service. For further particulars apply to

W. R. KERSCHNER CO., Inc., 50 Church Street NEW YORK, N. Y.

MACGOVERN AND COMPANY INC.

FRANK MACGOVERN, Pres. & Gen Mgr.

114 LIBERTY STREET NEW YORK CITY
'Phone, 3375-3376 Rector

60 CYCLE ROTARY CONVERTERS

1—300 KW. Westinghouse, 3 phase, 600 volts, D.C., 600 RPM., 500 amps., 370 volts AC., with starting motor.
1—100 KW. Gen. Elec., type TC, form A, 550 volts, 182 amps. DC., 340 volts AC., 1200 RPM.

25 CYCLE ROTARY CONVERTER

1—300 KW. Allis-Chalmers, 3 phase, 6 pole, 650 volts, 462 amps., 500 RPM.

Immediate Delivery

THIS IS OF NECESSITY ONLY A PARTIAL LIST—SEND FOR CATALOG

COMPLETE ARMATURES FOR SALE

FOR ALL THE STANDARD STREET RAILWAY MOTORS

GET OUR PRICE WE CAN SAVE YOU MONEY

America's Greatest Repair Works

CLEVELAND ARMATURE WORKS, Cleveland, O.

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL

Write for Price and Full Particulars to

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

Big Results from Little Ads

The advertisements in the Searchlight Section are constantly bringing together those who buy and sell, rent and lease or exchange. They convert idle commodities into useful cash, idle cash into useful commodities, and that which you have but don't want into that which you want but don't have. The cost is a trifle, the results considerable.

Get your Wants into the Searchlight

SEARCHLIGHT SECTION

BARGAIN

1—100 K.W. Westinghouse 550 Volts, 650 R.P.M., D.C. Generator, Compound Wound.....$400.00
F.O.B. Plant, Fond du Lac, Wisconsin.
Address

Eastern Wisconsin Ry. & Lt. Co.
Colby-Abbot Bldg., Milwaukee, Wis.

RELAYS AND ANGLES

3 miles 45 lb. steel relays and angles, extra fine.
1 mile 52 lb. steel relays and angles, extra fine.
1 mile 60 lb. A. S. C. E., practically new.
10 miles 70 lb. steel relays and angles, extra fine.

ZELNICKER in St. Louis
RAILS MACHINERY EQUIPMENT

ARCHER & BALDWIN

114-118 Liberty Street New York City

TELEPHONE 4337-4338 RECTOR

Rotary Converters, Alternating Dynamos,
Motor Generator Sets, Direct Current Dynamos,
Transformers, Alternating Motors
Railway Motors, Direct Current Motors,

ALSO ENGINES, BOILERS, CONDENSERS, HEATERS, ETC.

Send for catalogue giving complete list.

POSITIONS WANTED

ELECTRICAL engineer, technical graduate, 15 years' practical experience with General Electric, Westinghouse and public utility companies in engineering, construction and operation. Age 36, married; A-1 references. Box 773, Elec. Ry. Jour.

GENERAL auditor (34), wide and varied experience with following undertakings: Electric light and power, electric railways (city and interurban, passenger and freight, transcontinental railway, gas, hydro-electric and railway construction. Thoroughly conversant with Interstate Commerce Commission requirements. Arrangements made for special audits, examinations and installation of standard systems. Address Slaney, Box 64, Kerrisdale, Vancouver, British Columbia.

MASTER mechanic open for engagement; 18 years' experience. Well qualified to maintain and rebuild rolling equipment. Economic shop and successful labor manager. Highest grade references. Box 791, Elec. Ry. Jour.

TRACK foreman, roadmaster or engineer—Situation desired by graduate technical engineer experienced as foreman, inspector, chief clerk way and structures department, purchasing agent, twelve years' experience, nine with Stone & Webster; best references; hustler; salary desired $100 month. Box 769, Elec. Ry. Jour.

Get your Wants into the Searchlight

ADVERTISING RATES

Positions Wanted, Evening Work Wanted, 2 cents a word, minimum charge 50 cents an insertion, payable in advance.

Positions Vacant, Salesmen Wanted, Agencies, all undisplayed Miscellaneous ads, Machinery and Plants For Sale (with one line of display heading), 3 cents a word, minimum charge $1.50 an insertion.

All advertisements for bids cost $2.40 an inch.

Advertisements in display type cost as follows for single insertions:

1-16 page, $5.00	1 in. single col., $3.00
1-8 page, 10.00	4 in. single col., 11.60
1-4 page, 20.00	8 in. single col., 22.40

In replying to advertisements, send copies of testimonials, etc., instead of originals.

POSITIONS WANTED

WANTED—A position as superintendent of track and ways or roadmaster, by a man, age 39 years, with 24 years' practical experience in all branches of steam, street and interurban railway construction and maintenance work. At present employed as roadmaster. Best of references. Desired change not compulsory. Box 777, Elec. Ry. Jour.

FOR SALE

Cable For Sale

24,000 feet 1,500,000 C. M. bear copper cable, 12,000 feet 500,000 C. M. ditto and 4000 feet 1,000,000 C. M. ditto, in approximate 500-feet lengths, and all in first class second-hand condition. Purchasing Department South Side Elevated Railroad Company, 1009 Royal Insurance Bldg., Chicago.

One 150-Ton
WHEEL PRESS
One 150 H.P. Rice
AUTOMATIC ENGINE
ZELNICKER in St. Louis

Get Your Wants into the Searchlight

Undisplayed Cards Under Positions Wanted Cost 50 Cents for 25 Words

Keep Your Eyes on the Journal's Searchlight Section

Machinery Advertisements Undisplayed Cost $1.50 for 50 Words

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Over 300 different products are here listed.

The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

Accountants.
Greims Corporation, H. E.

Acetylene Apparatus. (See Cutting Apparatus, Oxy-Acetylene.)

Acetylene Service.
Searchlight Co., The.

Advertising, Street Car.
Collier, Inc., Barron G.

Alloys, Steel and Iron.
Titanium Alloy Mfg. Co.

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Anchors, Guy.
Johns-Manville Co., H. W.
Western Electric Co.
Westinghouse Elec. & M. Co.

Automobiles and Buses.
Brill Co., The J. G.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles.
Brill Co., The J. G.
Cambria Steel Co.
Carnegie Steel Co.
Cincinnati Car Co.
National Tube Co.
Niles Car & Mfg. Co.
St. Louis Car Co.
Standard Steel Works Co.
U. S. Metal & Mfg. Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
American General Eng'g Co.
Columbia M. W. & M. I. Co.

Badges and Buttons.
International Register Co., The
Western Electric Co.

Bankers and Brokers.
Halsey & Co., N. W.

Batteries, Dry.
Johns-Manville Co., H. W.
Nungesser Carbon & Bat'y Co.
Western Electric Co.

Batteries, Storage.
Electric Storage Battery Co.
Esterline Co.
Western Electric Co.

Bearings, Center.
Baldwin Locomotive Works.

Bearings and Bearing Metals.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
More-Jones Brass & Metal Co.
Railway Specialties Corpn.
St. Louis Car Co.

Bearings, Roller and Ball.
Railway Roller Bearing Co.
S. K. F. Ball Bearing Co.

Bells and Gongs.
Brill Co., The J. G.
Electric Service Supplies Co.
Ohio Signal Co.
Reiter, G. C.
St. Louis Car Co.
Western Electric Co.

Benders, Rail.
Niles-Bement-Pond Co.

Blow Torches for Soldering and Brazing. (See Cutting Apparatus, Oxy-Acetylene.)

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co.
Johns-Manville Co., H. W.

Boiler Coverings.
Johns-Manville Co., H. W.

Boiler Graphite.
Dixon Crucible Co., Joseph.

Boiler Tubes.
National Tube Co.

Boilers.
Babcock & Wilcox Co.

Bond Clips.
Electric Railway Improv. Co.

Bond Testers.
American Steel & Wire Co.

Bonding Apparatus.
Searchlight Co., The.

Bonding Tools.
American Steel & Wire Co.
Electric Railway Improv. Co.
Electric Service Supplies Co.

Bonds, Rail.
American Steel & Wire Co.
Electric Railway Improv. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Roebling's Sons Co., John A.
Western Electric Co.

Book Publishers.
McGraw-Hill Book Co., Inc.

Boring, Tools, Car Wheel.
Niles-Bement-Pond Co.

Braces, Rail.
Kilby Frog & Switch Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Piling and Lumber.)
American Bridge Co.
Electric Service Supplies Co.
Lindsley Bros. Co.
Western Electric Co.

Brake Adjusters.
Anderson Brake Adjuster Co.
Smith-Ward Brake Co.

Brake Shoes.
American Brake S. & Fdy. Co.
Barbour-Stockwell Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.
Railway Materials Co., The.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts.
Anderson Brake Adjuster Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
National Brake Co.
St. Louis Car Co.
U. S. Metal & Mfg. Co.
Westinghouse Traction Brake Co.

Brazing. (See Welding.)

Bridges and Buildings.
American Bridge Co.

Brooms, Track, Steel or Rattan.
Paxson Co., J. W.
Western Electric Co.

Brushes, Carbon.
Calebaugh Self - Lubricating Carbon Co.
Dixon Crucible Co., Joseph.
General Electric Co.
Jeandron, W. J.
LeCarbone Co.
Morgan Crucible Co.
Nungesser Carbon & Bat'y Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Brush Holders.
Railway Specialties Corpn.

Bumpers, Car Seat.
Electric Service Supplies Co.
Imperial Rubber Co.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.

Bunkers, Coal.
American Bridge Co.

Bunting.
Boyle & Co., Inc., John.

Bushings, Fibre.
Diamond State Fibre Co.

Bushings, Rubber.
Imperial Rubber Co.

Bushings, Steel and Brass.
Railway Specialties Corpn.

Buttons. (See Badges and Buttons.)

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc., see those Headings.)

Car Trimmings. (For Curtains, Doors, Seats, etc., see those Headings.)

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Cincinnati Car Co.
Jewett Car Co.
Kuhlman Car Co., G. C.
Niles Car & Mfg. Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.

Castings, Composition or Copper.
Anderson M. Co., A. & J. M.

Castings, Gray Iron and Steel.
American B. S. & Fdry. Co.
American Bridge Co.
American General Eng'g Co.
Columbia M. & W. & M. I. Co.
Falk Co.
Long Co., E. G.
St. Louis Car Co.
St. Louis Steel Fdry.
Standard Steel Works Co.
Union Spring & Mfg. Co.

Castings, Malleable and Brass.
American B. S. & Fdry. Co.
American General Eng'g Co.
Long Co., E. G.
St. Louis Car Co.

Catchers and Retrievers, Trolley.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Long Co., E. G.
Wood Co., C. N.

Ceiling, Car.
Pantasote Co.

Change Carriers.
McGill Ticket Punch Co.

Check Plates, Manganese Bronze.
Railway Specialties Corpn.

Cheese Cloth.
Boyle & Co., Inc., John.

Circuit Breakers.
Cutter Electrical & Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Clamps and Connectors, for Wires and Cables.
American General Eng'g Co.
Anderson M. Co., A. & J. M.
Electrical Engineers Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Klein & Sons, M.
Standard Railway Supply Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Cleaners and Scrapers, Track. (See also Snow-Plows, Sweepers and Brooms.)
Brill Co., The J. G.
Cincinnati Car Co.
Western Electric Co.

Cleats, Car Wiring.
General Electric Co.

Clusters and Sockets.
General Electric Co.

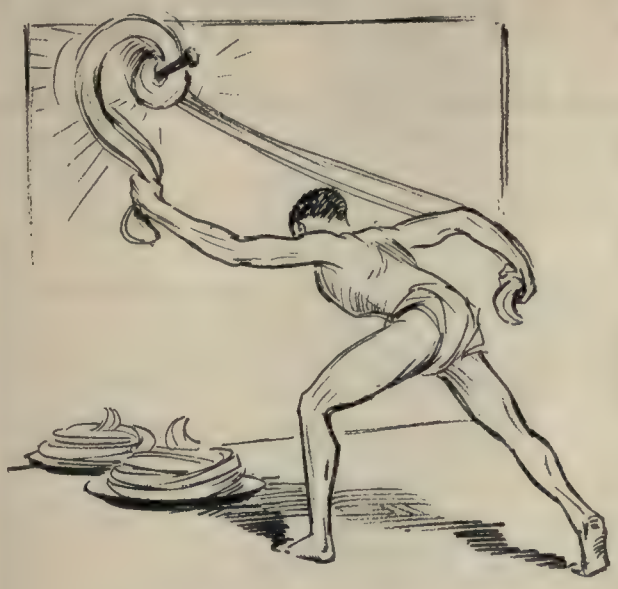
Coal and Ash Handling. (See Conveying and Hoisting Machinery.)

Coil Banding and Winding Machines.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Western Electric Co.

Coils, Armature and Field.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Roebling's Sons Co., J. A.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines.
International Register Co., The
Johnson Fare Box Co.



Muscat

Candy-making in Muscat is a spectacular performance.

The puller splashes the candy on a nail and develops good muscles thereby—but not as good candy as is obtainable by the little machines you see at Coney Island.

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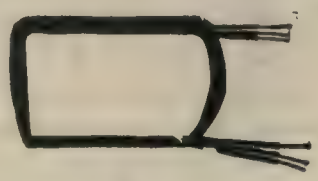

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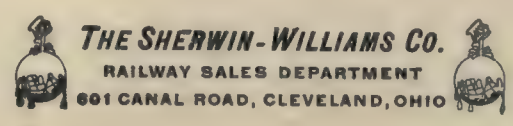

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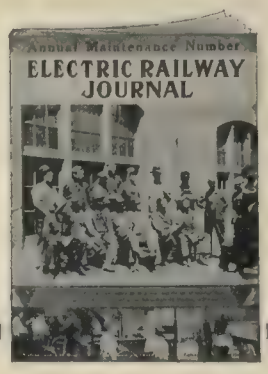

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New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.

If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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Titanium in Rail Steel

No. 26

The American Railway Engineering Association's Bulletin, July, 1913, gives the following service comparisons between Titanium-treated Open-Hearth, Standard Open-Hearth, and Electric Process Rails. Note the showing:

BOSTON & MAINE

Kind of Rail	Length of Service	Chemical Composition							% of Head Abraded
		C.	P.	Mn.	Si.	F.T.	Chr.	Ni.	
Open Hearth (Bethlehem)	27 mo.	.67	.025	87	.175				6.46
Open Hearth (Maryland)	27 mo.	.68	.016	75-80	.067		.51	.51	4.99
Titanium-treated, Open-Hearth (Lackawanna)	27 mo.	.88	.017	90	.144	.15			2.83
Titanium-treated, Open-Hearth (Lackawanna)	27 mo.	.85	.021	90	.144	.20			3.26
Open-Hearth (Lackawanna)	27 mo.	.71	.019	85	.118				4.19

Delaware, Lackawanna & Western

(1) Comparison of Open-Hearth, Open-Hearth Ferro-Titanium and Open-Hearth "Special Premium." The best showing has been made by the ordinary Open-Hearth.

(2) Comparison of Open-Hearth Ferro-Titanium and Open-Hearth "Special Premium." The Ferro-Titanium makes the best showing.

(3) Comparison of Open-Hearth Ferro-Titanium and ordinary Open-Hearth. The Ferro-Titanium makes the best showing.

Rock Island Lines

Comparative tests of Ferro-Titanium, Electric Process and ordinary Open-Hearth rails, all 100-lb. A. R. A. "A," are being made. All are of standard composition. After seventeen months the results are as follows:

	Area Abraded, Sq. In.		
	Ferro-Titanium	Electric	Open-Hearth
On 0° 50′ Curve	.012	.008	.075
On 1° 00′ Curve	.017	.137	.083
On Tangent	.012	.028	.078
Average	.014	.058	.075

The Ferro-Titanium is also being tried at two other points, viz:
On 1° 20′ curve, area abraded, .030 sq. in.
On 1° 30′ curve, area abraded, .010 sq. in.

The fact that the comparative tests reported above were made in every case by and for the railroads themselves makes them especially interesting as confirmatory evidence of the findings published in our Rail Report Bulletin.

Write for Rail Reports, Nos. 1 to 8 inclusive.

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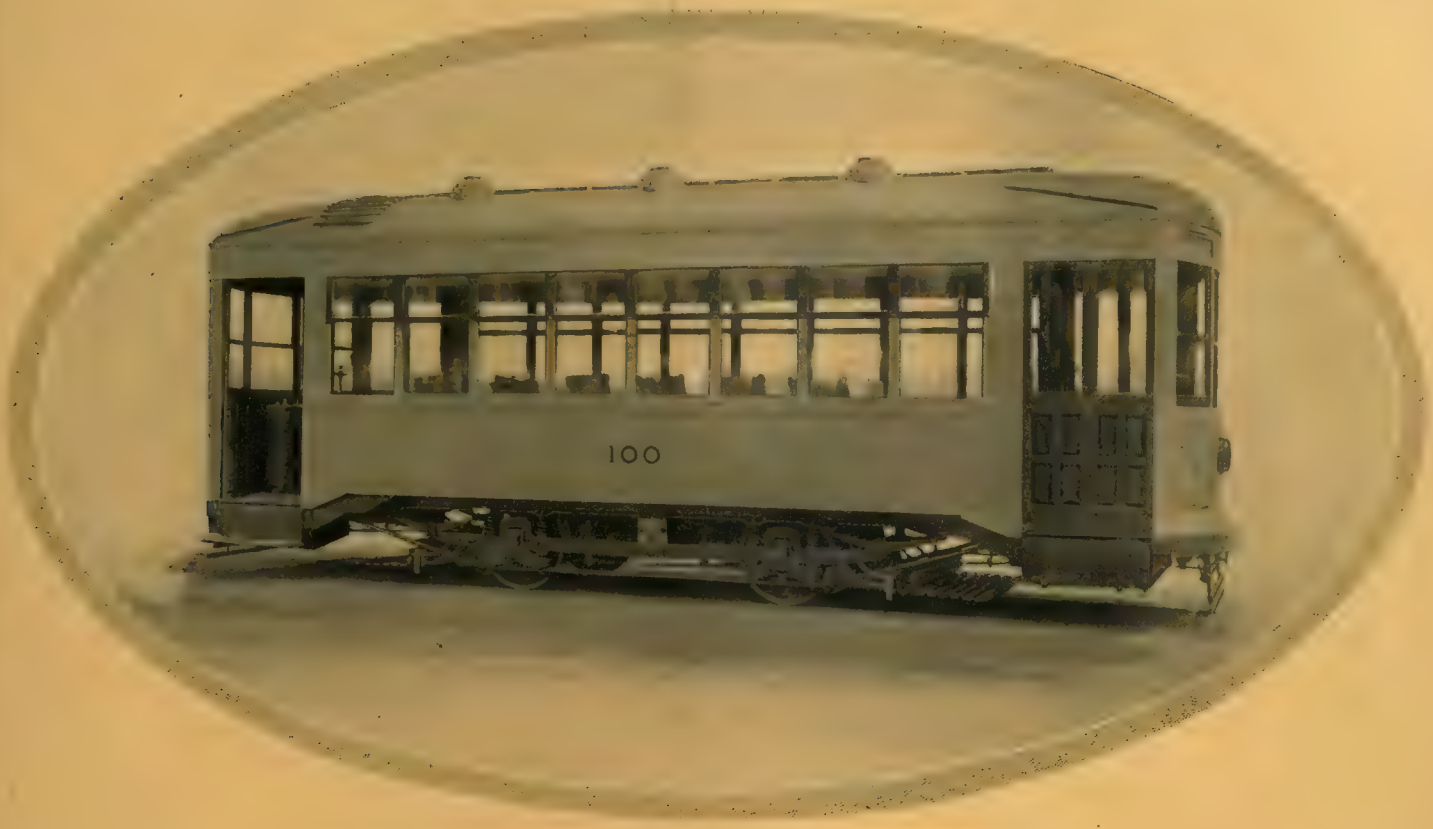

THE signs of the times point to a return to short, light cars in many quarters. This is both for efficiency and economy. Efficiency because of operating a larger number of cars. Economy because of the lower operating cost between rush hours and lower maintenance charges; and, in many places, one-man operation. A bulletin just published contains illustrations and data on a dozen different types and will give you useful and up-to-date information on the subject. Send for a copy. It is Bulletin No. 216.

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ELECTRIC RAILWAY JOURNAL
MAY 22, 1915

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Volume 46
Number 5
July 31, 1915

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New York, July 31, 1915

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ELECTRIC RAILWAY JOURNAL, July 31, 1915. 2¼ cols.

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(Its relation to efficient brake control of moving trains)

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A RAILROAD TRAIN IS PECULIAR IN THAT WHILE ACCELERATION—THE HAULING CAPACITY OR TRACTIVE EFFORT OF THE LOCOMOTIVE—DEPENDS FUNDAMENTALLY UPON FRICTION—(WHEEL—RAIL); DECELERATION—BRAKE CONTROL OF ALL TRAIN MOVEMENT—ALSO DEPENDS FUNDAMENTALLY UPON FRICTION (WHEEL—SHOE).

ON THE ONE HAND WE HAVE HEAVY TRAINS AT HIGH SPEEDS REPRESENTING UNBELIEVABLE TOTALS OF FOOT TONS OF ENERGY; ON THE OTHER HAND WE HAVE, TO CONTROL THIS MOVING MASS, THE FRICTION OF A FEW SQUARE INCHES OF BRAKE SHOE IN CONTACT WITH A ROTATING WHEEL.

BRAKE SHOE FRICTION AND TRAIN RETARDATION RESULTING THEREFROM VARY WITH LEVERAGE. PRESSURE, TEMPERATURE, DURATION OF CONTACT, LOCATION OF BRAKE SHOE ON WHEEL, BRAKE MECHANISM DESIGN INVOLVING ABILITY TO ALTERNATE AND GRADUATE BRAKING POWER ON THE TRAIN, AND A HUNDRED OTHER FACTORS WHICH ENTER INTO THIS MOST COMPLEX AND INVOLVED BRANCH OF AIR BRAKE ENGINEERING.

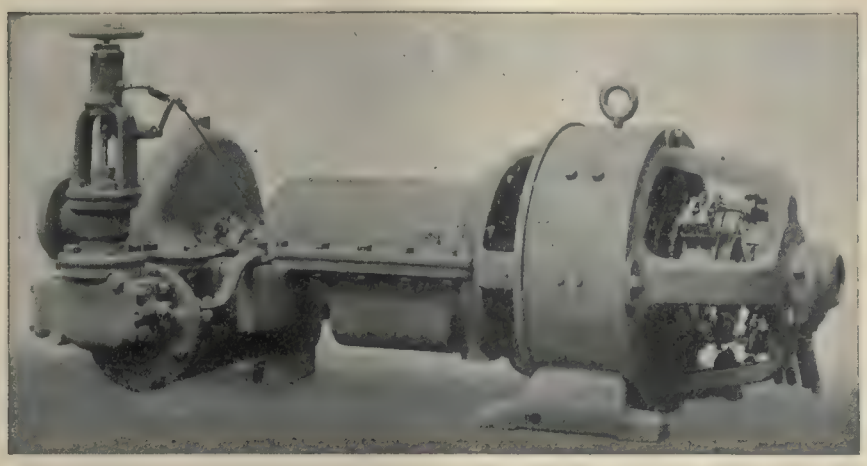
AIR BRAKE ENGINEERING IS MAINLY CONCERNED WITH THE FLEXIBLE, RELIABLE AND EFFECTIVE APPLICATION OF FRICTION TO PROPERLY CONTROL ALL TRAFFIC MOVEMENT BY RAIL.

Suggested by the

Westinghouse Traction Brake Company

Works: Wilmerding, Pennsylvania

PITTSBURGH: Westinghouse Building
CHICAGO: Railway Exchange Building
NEW YORK CITY: City Investing Building
ST. LOUIS: Security Building



Geared Turbines

In Small and Medium Sizes

The Westinghouse Geared Sets mark a distinct advance in the building of small alternating and direct current units. The turbine operates at a high, economical speed, and the generator at such a low speed that commutation and mechanical troubles are unknown.

The unit is self-contained and very compact, so no expensive foundations are required. The lubricating system is entirely automatic and needs but infrequent attention as there are no oil or grease cups to be filled. The amount of oil used is but a fractional part of that required by a reciprocating engine of the same size and the exhaust is free from oil.

The units are very simple and so designed and built that long life and thorough reliability are assured.

Westinghouse Electric & Manufacturing Co.

East Pittsburgh, Pa.

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
Bluefield, W. Va.
Boston, Mass.
Buffalo, N. Y.
Butte, Mont.
Charleston, W. Va.
Charlotte, N. C.
Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio
Columbus, Ohio
*Dallas, Tex.
Dayton, Ohio
Denver, Colo.
Detroit, Mich.
*El Paso, Tex.
*Houston, Tex.
Indianapolis, Ind.
Joplin, Mo.
Kansas City, Mo.
Louisville, Ky.
Los Angeles, Cal.
Memphis, Tenn.
Milwaukee, Wis.
Minneapolis, Minn.
New Orleans, La.
New York, N. Y.
Omaha, Neb.
Philadelphia, Pa.
Pittsburg, Pa.
Portland, Ore.
Rochester, N. Y.
St. Louis, Mo.
Salt Lake City, Utah
San Francisco, Cal.
Seattle, Wash.
Syracuse, N. Y.
Toledo, Ohio
Washington, D. C.

*W. E. & M. Co. of Texas

PUBLISHER'S PAGE

Buy, Boom and Use Advertised Products Because:

[4]

Advertising is Useful Only to Those Who Have a Message of Genuine Service to Tell

Advertising, in the sense in which we know it, was born to boom quacks and their nostrums.

That was many years ago. All business experience has proved that advertising is infinitely more effective in promoting a worthy cause than in disguising a fraud.

Business men who can see the dollars beyond the nearby penny, know that only he who serves can sell profitably year after year.

Therefore, in a publication like Electric Railway Journal, in which only reputable business organizations are permitted to proclaim their activities, the advertising pages become a reliable guide to commodities that may be bought with perfect safety; to business men who believe in and practice fair dealing.

Electric Railway Journal advertisers depend for their business life on their ability to render a genuine service to the electric railway industry. It is practically impossible to write an advertisement that will interest intelligent electric railway men in a product that is unsuited to their needs. Any advertiser who attempted it would fail to make his advertising pay, if he were permitted to advertise at all.

So only those with a genuine message of service to the field can use the Electric Railway Journal's advertising columns.

That it pays to read advertising of this character is almost an axiom.

This is part of a series that discusses the buyers' interests in connection with advertised products under headings outlined in our issue of July 3, page 6.

READ THE SERIES — APPLY IT—

Buy, Boom and Use Advertised Products

It's up to YOU

Good management alone can produce good service. In this the "human element" governs the degree of success attained—BUT

It's up to SIGNALS

—automatic signals to protect your **good** service with **safe** service—
because the "human element" is a **dangerous** factor in operation.

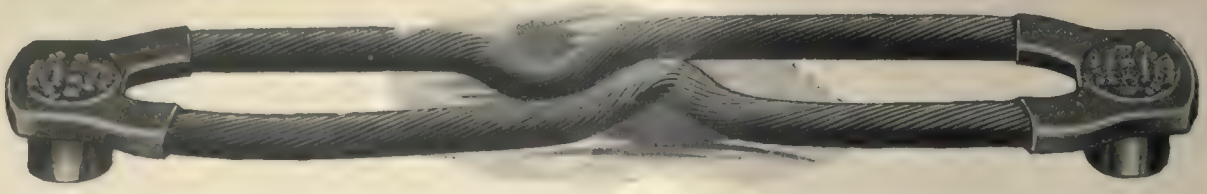
If for no other reason than sound executive policy you ought to use **automatic** electric signals of some kind. The better the signal the better the service. Of course we urge you to install U. S. Electric signals because the majority of signalled roads have found that they better meet demands.

It's up to you.

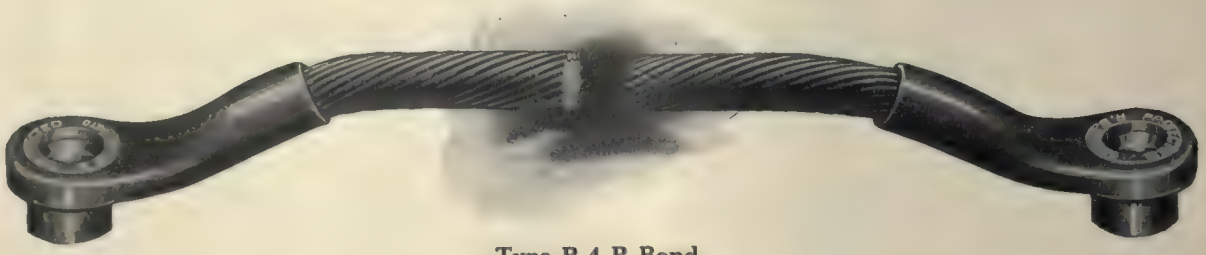
U.S. ELECTRIC SIGNAL CO. WEST NEWTON, MASS.

United States Electric Signal Co.
West Newton, Massachusetts

Foreign Representatives:
Quilliam Brothers, Cleggs Court, Chapel Street, Salford, England



Type F C Bond



Type P 4 P Bond

The Right Rail Bonding Saves Financial Bonding

Few things have a greater effect on an electric railway company's treasury than the efficiency of the rail bonding. Because a rail bond, unless it does its work well, is a constant source of loss and expense which is reflected in many ways—**notably in loss and cost of power.**

Last week we sent to every electric railway official on our lists a little 24-page book

"How Dollars Are Lost"

a remarkable book on rail bonding; a book that told in plain language just what poor rail bonding costs in dollars and cents.

Did you get your copy? Did you read it through? Did you study it carefully?

If you want to know

"How Dollars Are Saved"

why not take the matter up with the pioneer company in the design and installation of "PROTECTED" Rail Bonds? With a company which has been up against the bonding game from every standpoint? Which has designed many of the most efficient and durable bond installations now in service? Which has successfully solved so many of the most difficult problems in bonding—problems pronounced impossible by others?

These are not glittering advertising generalities. They are cold, hard, sober **facts.**

Wouldn't it be logical for you to do this right now? To ask us **now** to tell you how many dollars

"Protected" Rail Bonds

will save you. And all without obligation on your part.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA	NEW YORK	CHICAGO
17th and Cambria Sts.	Hudson Terminal	417 So. Dearborn St.

JOHNS-MANVILLE SERVICE COVERS THE CONTINENT

JOHNS-MANVILLE SERVICE TO THE ELECTRICAL INDUSTRY

BEFORE the telephone came into use it was no hardship to write letters to each other and before the electric cars became general we didn't seem to mind walking. But it's surprising how accustomed we get to these conveniences and how we miss them when they are not handy.

People who use Johns-Manville Service find it a real convenience, and judging by the way they use it, they don't want to be without it.

If this is a convenience that you haven't used, try it and see how handy it is. You won't want to be without it either.

The Smooth Bore of J-M Fibre Conduit prevents damage of the Sheath, 90% of your line trouble

And there isn't anything easier than coupling up a joint on a J-M Fibre Conduit. Every time you make a joint the duct is 5 feet longer. It costs very little to haul and handle it, owing to its extreme lightness. Its interior is as smooth as the "lead covered" you pull into it, and when the job is done there is a sound cable in the duct.

Its dielectric strength is enormous. It has a puncture test of 24,000 volts after immersion in water for 200 hours, voltage terminals being applied through a conduit having ¼-inch wall. Doesn't this argue well for its ability to stand short-circuit conditions in the presence of seepage?

J-M Fibre Conduit is mechanically strong and absolutely homogeneous in structure.

It is the logical material for your requirements regardless of what you are using or intend to use. Write for all the facts. They are convincing.

J-M Fibre Conduit during installation

A Fuse is Supposed to do a Specific Thing—Protect. That is what Noark Fuses Do—Always

Before a fuse can protect it must be right itself—carefully designed, well made, and accurately tested.

The care and watchfulness exercised in the manufacture of "Noark" Fuses would be a revelation to any one who could see the process, and all this because these fuses must be positive in operation.

We do not try to account for the great demand for "Noark" Fuses nor their record over the past years, on any other basis than that of good design and good construction. We do not believe we need to.

So that when we sell you a "Noark" Fuse we feel that you are buying one hundred per cent value in protection, and that's all a fuse can give you.

H. W. JOHNS-MANVILLE CO.

Manufacturers of Service, Subway and Transformer Boxes; Line Materials; Insulating Materials; Fibre Conduit; Fireproof Wood; Friction Tapes; Dry Batteries, Lighting Systems, etc.

Akron	Cleveland	Houston	New Orleans	Salt Lake City
Albany	Columbus	Indianapolis	New York	San Francisco
Atlanta	Dallas	Kansas City	Omaha	Seattle
Baltimore	Dayton	Los Angeles	Philadelphia	Syracuse
Birmingham	Denver	Louisville	Pittsburgh	Toledo
Boston	Detroit	Memphis	Portland	Washington
Buffalo	Duluth	Milwaukee	Rochester	Wilkes-Barre
Chicago	Galveston	Minneapolis	St. Louis	Youngstown
Cincinnati	Houghton	Newark	St. Paul	

THE CANADIAN H. W. JOHNS-MANVILLE CO., LTD., Toronto, Montreal, Winnipeg, Vancouver 3141A 3040-3101 B

The Method of Packing a Journal

leaves an impress on the lubrication cost sheet.

If it's improperly packed the best of lubricants can never right the wrong.

By working with the car house men Galena experts get them into the habit of properly packing journals.

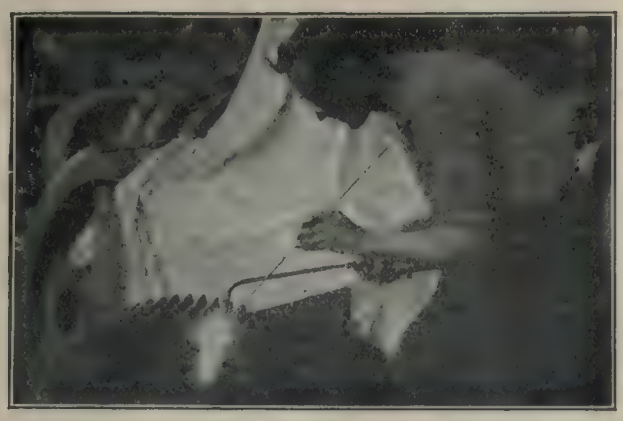
Then by using Galena oils the cost goes down to bed-rock.

We *guarantee* the saving.

GALENA SIGNAL OIL COMPANY

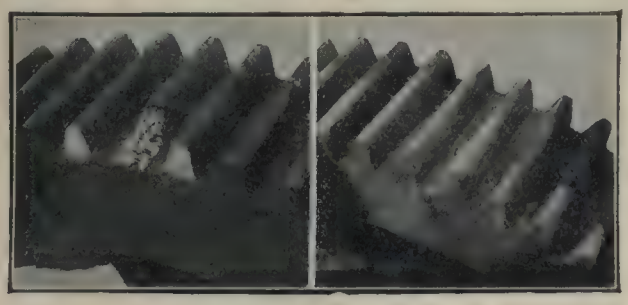
Franklin, Pa.

3151



Operator applying new metal to broken gear tooth. This gear has nickel steel rim shrunk on cast steel frame. Prepared for machining in fifteen minutes at a cost for gas and labor of 42 cents.

Applying new metal on motor nose. Corner piece shows finished job. No grinding needed. Done in 16 minutes with only 76 cents cost for gas and labor.



View at left shows broken teeth being filled above. View at right shows same teeth, built up, ready for machining.

At left, main shaft broken bolt cutter ready for welding. New part costs about $20, subject to about 3 weeks' delay. At right, part is shown after welding, ready for machining. Cost of gas and labor making weld 84 cents. Cost of machining $1.50. Accomplished on the spot—in less than day's time.

In shop practice Oxy-Acetylene Welding turns waste into profit

Here you find almost unlimited opportunities to save time and money. The illustrations are routine work—an indication of what you can do in your shop.

Worn and damaged equipment, that heretofore was junked, because repair costs by other methods were excessive, can be easily, quickly and economically made good as new by oxy-acetylene welding with

PREST-O-LITE

Dissolved Acetylene (Ready-made Carbide Gas)

Shop cost records kept by one railroad show actual savings totaling thousands of dollars each year.

Equal savings are possible in your shop. The cost of necessary equipment is low. We furnish a thoroughly high-grade welding apparatus for $60.00, not including acetylene cylinders, which are extra and are furnished under a liberal service plan. Truck and special equipment for cutting operations at extra cost.

The welding operation is simple, economical and rapid. The portable Prest-O-Lite equipment has unlimited utility for emergency repairs on special work and the largest construction or repair jobs. Can also be taken out on the track for rail bonding. Oxy-Acetylene welded bonds possess maximum and constant conductivity, are easily applied and are as *permanent* as the rails themselves.

Prest-O-Lite Acetylene Service furnishes the highest grade of Dissolved Acetylene in portable cylinders, used as conveniently as you use cylinders of oxygen. Saves the large initial outlay and heavy depreciation, trouble and inconvenience of making crude acetylene in carbide generators. Besides, Prest-O-Lite Dissolved Acetylene is perfectly dried, cleaned and purified—makes better welds and is cheaper to use.

You should have our instructive literature on Oxy-Acetylene Welding and Cutting as applied to Electric Railway practice. It shows actual instances of savings made, and suggests new ways to save money on shop repairs. Send for it today.

The Prest-O-Lite Co., Inc., 805 Speedway, Indianapolis, Ind.

The World's Largest Makers of Dissolved Acetylene

53 direct factory branches and charging plants in principal industrial centers

What Your Customers Say

about the

Annual Convention Number

of the

Electric Railway Journal

"It is
of great value in the purchasing department"

says the Superintendent of a Kansas railway. "I save the Convention Number, as I find it contains many articles of live interest and valuable advertising matter."

"It is
in frequent use for reference purpose"

says the General Manager of a Wisconsin railway. "Our railway department finds in your advertising pages a complete directory which no up-to-date electric railway could well do without."

"It is
in itself a complete purchasing guide"

says the Manager of a Texas railway. Here is a significant statement from a man who uses the advertising section of the Convention Number.

"It is
more than the regular form of directories which are issued"

says the Vice President and General Manager of an Iowa railway. "Your advertising pages are our most ready reference. I can always find something in them to interest me."

This year it will be

Published Sept. 18

Now is none too early to send copy and cuts for your advertisement in this issue. Do this today and insure the best location and satisfactory handling. Or

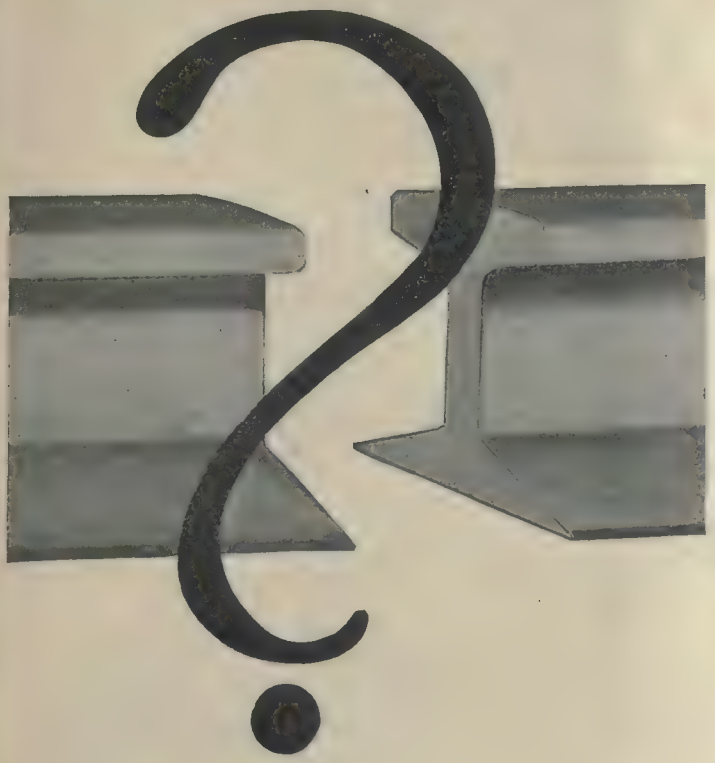
We will prepare your advertisement

in our Copy Service Department without charge. It is to your best interest to act quickly.

Electric Railway Journal

[Member Audit Bureau of Circulations]

239 West 39th Street, New York



Which Shall It Be?

Corroding
or
Non-corroding
Rail Bonds.

Electric Weld Bonds do not corrode at the terminals.

The Electric Railway Improvement Co.
Cleveland, Ohio

Combine Your Electric Railway and Electric Lighting Pole

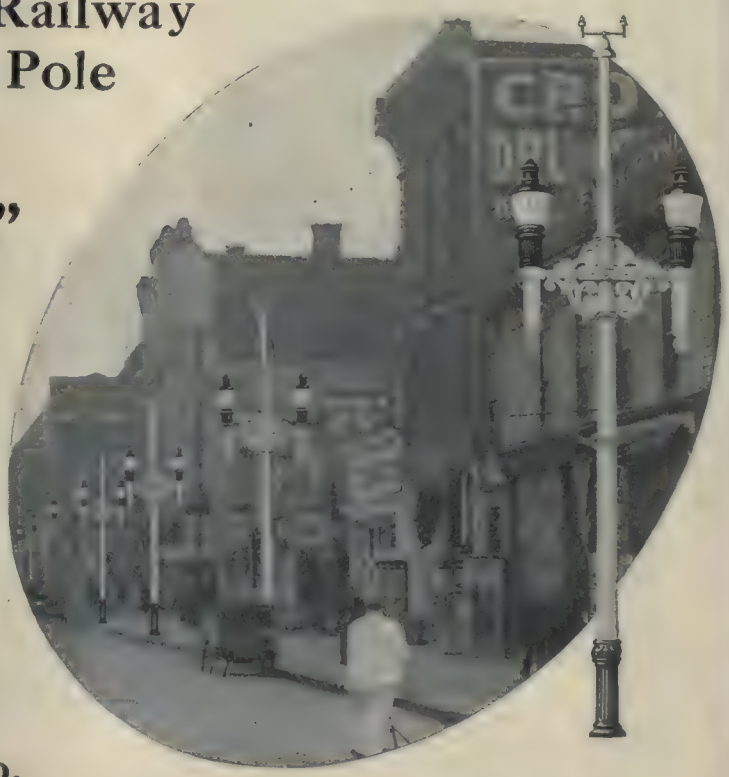
"ELRECO COMBINATIONS"

are your big opportunity for cutting line upkeep. Here is the economy you have been considering, discussing and advising. These "double-purpose" poles will halve your initial cost.

And at the same time their patented "Wire-Lock" Swedge Joint features make "Elreco" poles corrosion-resisting and proof against telescoping.

Sounds good?

Get the data.



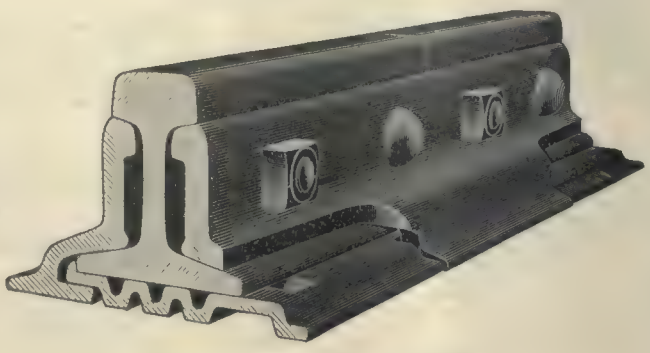
Electric Railway Equipment Co.
Cincinnati, Ohio

New York 30 Church St.

Send for Catalog No. 16

The Rail Joint Company
185 Madison Avenue
New York

ROLLED
FROM
BEST QUALITY
STEEL



WOLHAUPTER RAIL JOINT

AGENCIES

Boston, Mass.....India Bldg.
Chicago, Ill..Railway Exchange Bldg.
Denver, Colo.....Equitable Bldg.
Philadelphia, Pa.Pennsylvania Bldg.
Pittsburgh, Pa.....Oliver Bldg.
Portland, Ore.....Wilcox Bldg.
St. Louis, Mo.,
Commonwealth Trust Bldg.
Troy, N. Y.....Burden Avenue

Montreal, Can.....McGill Bldg.

London, E. C., Eng.,
36 New Broad St.

Makers also of CONTINUOUS, WEBER and ONE HUNDRED PER CENT. RAIL JOINTS for Standard, Girder and Special Rail Sections. Also Joints for Frogs and Switches; Insulated Rail Joints and Step or Compromise Rail Joints

PATENTED IN UNITED STATES AND CANADA 3

The On-Time Advertiser

who gets his copy and cuts to us well before the day his advertisement should go to press, gets better type composition, better location and a better opportunity to make necessary corrections on the proofs which can then be submitted before publication.

The Last-Hour Advertiser

whose copy and cuts come in at the last minute or even later, gets the best attention we can possibly give him. We work overtime to do what we can for him. But the lack of sufficient time makes it physically impossible to do as well for him as for the advertiser whose instructions come in well before the last hour.

Get Your Copy and Cuts in Early

Do this, not on our account, but for the sake of your own advertising. We want to serve all advertisers equally well—but we can't put more hours into a day, and the advertiser who gives us the most time gets the best results.

Copy and cuts should be in our hands by Thursday of the week preceding the date of issue. This means that Thursday is the *last* day on which copy can be handled normally.

After that we cannot promise proofs, and we cannot insure classification.

For good advertising, get your cuts and copy in every week *before* Thursday.

Electric Railway Journal
239 West 39th Street, New York

Highest Award on Electric Meters, the Medal of Honor at The Panama-Pacific International Exposition,—See Our Exhibit in the Palace of Machinery

You Let Him See where he is going

—Let him see what current he is using.

That will assist him in operating controller and brakes to the best advantage. And when these are operated right he is enabled to effect some sound economies for the road.

In one case the saving effected amounted to $12,000 annually.

There is but *one* method of giving the motorman an indication of the power he is using.

ECONOMY
BUILT LIKE A WATCH
METERS

Just how they work to the advantage of motorman and road is the subject matter in Bulletin 416. Yours on request.

Sangamo Electric Company
Springfield, Illinois

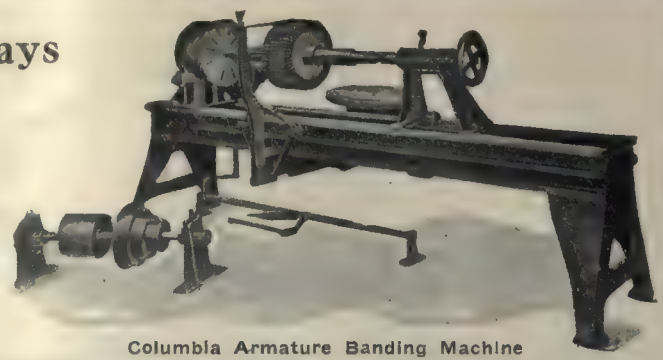
NEW YORK 50 Church St. | MINNEAPOLIS Metropolitan Life Bldg. | ROCHESTER Mercantile Bldg.
LOS ANGELES, San Fernando Building
SANGAMO ELECTRIC COMPANY of CANADA, LTD.
Montreal and Toronto

"They have saved Electric Railways thousands of dollars"

COLUMBIA

CAR AND REPAIR SHOP EQUIPMENT

Our high scale of manufacture means low cost to you—and no skimping in quality.

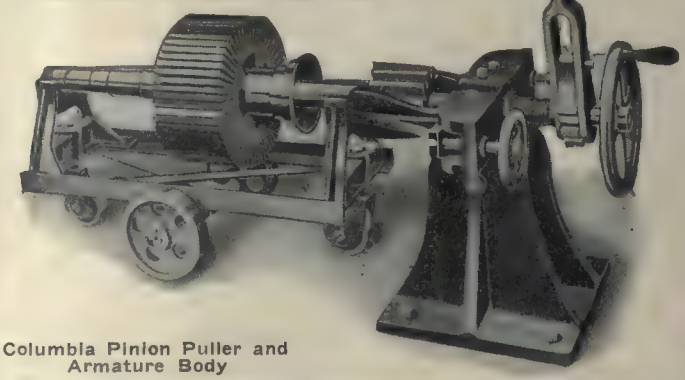


Columbia Armature Banding Machine

We Make
Axle and Armature Straighteners. Bearings for Armatures and Axles. Armature Stands. Armature Buggies. Car Hoists. Car Replacers. Brake Appliances, Handles, Forgings for Brake Rigging, etc. Babbitting Moulds, Lathe Chucks. Banding and Heading Machines. Coil Winding Machines for field and armature coils. Coils for Armatures and Fields. Coil Taping Machines for Armature Leads. Rolls for Flattening Leads of Armature Coils. Car Trimmings, Car Signs—Day and Night. Commutators, Controller-Handles, Door Locks, Gear Cases—All Steel and M.I., Pit Jacks. Grid Resistances. Signal or Target Switches. Pinion Pullers, Trolley Poles Steel. Trolley Wheels. Tension Stands. Fuses. N. W. Cartridge. Car Wheel Hoists and Special Track Work.

Columbia Machine Works & Malleable Iron Co.
Atlantic Ave. and Chestnut St.
Brooklyn, N. Y.

Columbia Field Coil Winding Machine



Columbia Pinion Puller and Armature Body

1

Energy

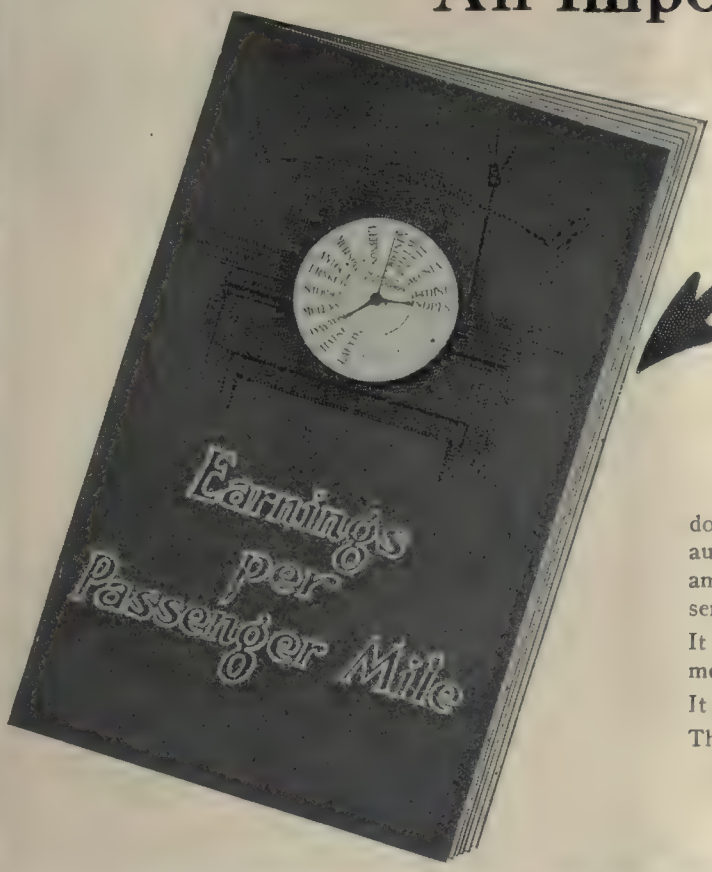
which represents your expenditure for coal, for depreciation of power generating machinery, for land rentals, for labor—spent to move cars—
Suppose the demand for that energy were to come down 15% while you were moving the same traffic—
It's been done—it's being done—
by the application to cars of

Rollway Bearings

And the railway systems that have thus equipped their cars are effecting that saving and savings in other directions.
Do you want to?
Write us.

The Railway Roller Bearing Co.
Syracuse, N. Y.

An Important Contribution to the Fare Question



It tells the story of a fare recorder which operates on the basis of the mileage travelled by the person paying the fare—

The Bonham Traffic Recorder

does that and it does more. It classifies each fare for the auditor, so allowing him to know with exactitude the amount earned by every train and the earnings per passenger mile.

It supplies to the operating department a tabulated statement of traffic between stations by trains.

It offers the solution of all your fare collection problems.

The catalog should be in your hands. *Write for it.*

The Bonham Recorder Co.
Hamilton, Ohio

The Occasional Reader is Appreciated *but*—

if it is good to read the Electric Railway Journal occasionally, it is better to read it regularly. Looking through some subscriber's copy is spending time to good advantage. Looking through your own copy is better.

It is the *regular* reader who gets the most out of Electric Railway Journal

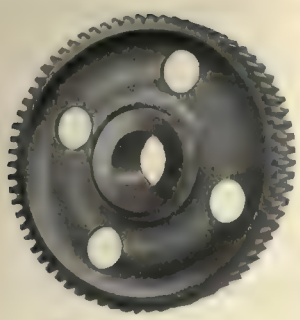
He not only gets the best ideas of the railway industry promptly, but he gets something even more important—a view of the continuous movement toward progress—the only way to keep constantly in touch with the trend of the times. Inasmuch as progress is largely evolutionary rather than revolutionary, he who knows the direction of the progressive drift is best equipped to take advantage of it.

Read the Electric Railway Journal—read it every week.

If you are not now a subscriber, send your subscription and make sure of having a copy of the Electric Railway Journal which you can file for future reference.

NOTE—No special effort is being made to increase the *volume* of Electric Railway Journal circulation—now 8,000 copies per week. We are, however, always eager to *strengthen* the circulation by allowing subscriptions to lapse where the Electric Railway Journal is not used with maximum efficiency and to substitute subscribers who can and will make good use of the editorial and advertising pages. If you fit into the latter class, your subscription will be welcomed. Subscription $3.00 per year in the U. S., $4.50 in Canada, $6.00 elsewhere.

Electric Railway Journal, 239 West 39th Street, New York



Actual Life of Grade M Exceeds Estimates

Tests ranging over a period of about three years have demonstrated that Grade M gearing withstands wear even better than was predicted when this grade was first put upon the market. The estimated life factors given in our bulletin of 1913, based on a factor of one for untreated cast steel gears, were:

Untreated forged steel	1.25
Oil tempered forged steel	1.75
Grade M	**2.75**
Case hardened forged steel	3.

Some of the Grade M gears on test under actual service conditions have been in use for 225,000 miles without appreciable signs of wear. In fact, present indications are that the life of Grade M will very nearly equal that of the more expensive case-hardened grade.

These facts not only establish the conservatism of the General Electric Company's claims but also prove the wise economy of the twenty-three roads that have already standardized on Grade M.

Standardize *your* road with the "More Miles per Dollar" gearing.

General Electric Company

General Office: Schenectady, N. Y.

ADDRESS NEAREST OFFICE

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
Boston, Mass.
Buffalo, N. Y.
Butte, Mont.
Charleston, W. Va.
Charlotte, N. C.
Chattanooga, Tenn.
Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio
Columbus, Ohio
Dayton, Ohio
Denver, Colo.
Des Moines, Iowa
Duluth, Minn.
Elmira, N. Y.
Erie, Pa.
Fort Wayne, Ind.
Hartford, Conn.
Indianapolis, Ind.
Jacksonville, Fla.
Joplin, Mo.
Kansas City, Mo.
Knoxville, Tenn.
Los Angeles, Cal.
Louisville, Ky.
Memphis, Tenn.
Milwaukee, Wis.
Minneapolis, Minn.
Nashville, Tenn.
New Haven, Conn.
New Orleans, La.
New York, N. Y.
Niagara Falls, N. Y.
Omaha, Neb.
Philadelphia, Pa.
Pittsburg, Pa.
Portland, Ore.
Providence, R. I.
Richmond, Va.
Rochester, N. Y.
St. Louis, Mo.
Salt Lake City, Utah
San Francisco, Cal.
Schenectady, N. Y.
Seattle, Wash.
Spokane, Wash.
Springfield, Mass.
Syracuse, N. Y.
Toledo, Ohio
Washington, D. C.
Youngstown, Ohio

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WHY RUSH-HOUR ENERGY COSTS MORE

The rather disappointing increase in energy unit cost in Chicago, noted in a reference to the recent report of the Board of Supervising Engineers on page 138 of last week's issue of this paper, emphasizes the unfortunate effect of rush-hour traffic on the power station load factor. In Chicago between 1909 and 1913 the cost of energy rose from 0.711 cent to 0.742 cent per kilowatt-hour, although the consumption increased more than 68 per cent. In the same period, however, the statistics show that the average load factor for the year decreased from about 55 per cent to about 45 per cent. It costs more to generate energy for rush-hour service for the same reason that rolling stock and labor cost more per car-mile when used in intermittent service. Power plant equipment must be provided for the maximum demand no matter how short the duration of the demand may be. A typical load-duration curve printed on page 422 of the issue of the Electric Railway Journal for Sept. 5, 1914, shows that with a 30,000-kw. plant installed in Rochester, N. Y., the load is above 20,000 kw. for but 450 hours per year; it is above 16,000 kw. for but 3000 hours, and above 12,000 kw. for but 5500 hours, while only 4000 kw. of load continues throughout the year. J. C. Parker, electrical engineer of this plant, estimates the annual cost of the extra generating and distribution equipment needed to supply the short-duration load at $750,000, or about 50 cents a kilowatt-hour, with no allowance for fuel, labor, etc. This is worse than the relative cost of the traditional amateur gardener's cabbages.

ENERGY COST AND LOAD FACTOR

The purchaser of electrical energy is apt to think of it as a commodity to be purchased at a more or less uniform price per kilowatt-hour in given quantities. Of course, he ordinarily expects to, and does, get the energy more cheaply in large quantities, but as has been seen this is not a necessary result. Whether a company generates its own power or buys it, the cost will be determined partly by the "when" factor and partly by the "how much" factor. This is true of the small customer's demand, as well as of the demand by the large customer, although the principle with small customers is still being but grudgingly accepted. The Chicago Surface Lines' contract, involving as it does such enormous monthly charges, about a quarter of a million dollars, is undoubtedly as scientifically drawn a contract as is possible. While its application to such an extreme case was not contemplated, it is interesting to inquire what it would show if the load were of 100 per cent load factor. By the method outlined in last week's abstract a simple calculation shows that if the present annual consumption, divided according to the relative requirements of the surface line companies in the proportion given in the report, could be used at a uniform rate the cost would be about 0.57 cent per kilowatt-hour. The difference from the actual cost of 0.74 cent, 0.17 cent, or nearly 30 per cent increase over the theoretical minimum, is due to the poor load factor and measures the cost, to the railway company, so far as power is concerned, of the irregularity of its traffic. In Chicago the demand charge is determined from the average of six hours' load taken from the morning and evening peaks on three successive days, provided that this is not less than previous demands similarly determined and that it is the maximum average which can be obtained by the given method during the month. For each extra kilowatt of demand the price averages about $1 per month and the price of the corresponding kilowatt-hour is very high because the load peaks are of short duration.

ELECTRIC ROADS RANK HIGH IN PUNCTUALITY

An appropriate obituary of the old joke about the chronic irregularity of trains appeared recently in the editorial columns of the New York *Evening World*. In order to show the improvement made by the railroads in running trains on time the editorial quotes figures issued by the Public Service Commission of New York, Second District, which show that of 67,080 passenger trains running on the railroads included by this district during June, 1915, 93 per cent arrived at their division terminals on time, *i.e.*, not more than five minutes late, the New York, Westchester & Boston Railway holding the highest percentage for any one railway of the group, namely, 99.4 per cent. While we agree heartily with the closing recommendation of our contemporary's editorial to "give modern railroading its due" for the high standard of punctuality attained, we think it only fair to add also, "give heavy electric traction its due!" That the Westchester percentage is not a chance figure is shown by the fact that this line averaged 99.2 per cent for twelve months ending June 30, 1915. The high standard of punctuality for electrified roads is not confined to the Westchester alone. The electric divisions of the other lines included by the same Second District territory, *i.e.*, the Hudson and Harlem divisions of the New York Central lines, and those of the New York, New Haven and Hartford Railroad show in the recent reports excellent figures for promptness, the figures in every case being above and

sometimes well above the average for that month. The average number of minutes late per train run by these same lines is also proportionately low, the New York, Westchester & Boston Railway even averaging for the last year under one-tenth of a minute late per train.

THE PUBLIC'S INTEREST IN SKIP-STOPS

Time saved for the traveling public may have a rather nebulous value when calculated in dollars and cents. Nevertheless, experience with the jitney has shown beyond a doubt that the average rider considers his minutes spent en route to be no insignificant factor, and on that basis the recently proposed skip-stop plans in Chicago and St. Louis stand as an impressive public benefit. A simple calculation will determine what the latter is. Taking St. Louis, for example, the proposed plan involves the abolition on the routes in question of 720 stopping points, each one of which necessitates a roughly approximate loss of fifteen seconds in acceleration and retardation and in the stop itself whenever a car passes. Upon the assumption that the average stopping point is passed by a car at least 200 times during the course of a day and that the average car contains some thirty passengers, there is a daily saving of 20,000 passenger-hours. Even under a time value for passengers of only 10 cents per hour (a figure that might be otherwise expressed as equivalent to a willingness on the part of the average passenger to pay 5 cents for a ride that could be made in fifteen minutes, although he could get to his destination without expense in three-quarters of an hour) the time-saving value to the public of the St. Louis skip-stop plan would be $2,000 daily, or $600,000 per annum. Here is an indirect return to the community that is roughly equal to the amount now paid in taxes to the city by the railway. It seems impossible to imagine that a proposal to increase the tax payments by 100 per cent could meet with public disapproval, yet this attitude, or its equivalent, seems invariably to follow any plan to eliminate stops. Is not this a good subject for a campaign of popular education?

LABOR AND ARBITRATION

Undoubtedly one of the most serious problems now before the electric railway companies of the country is the labor problem. The jitneys have been making inroads into the gross receipts of the companies, but this trouble is generally considered to be temporary. Labor will always be necessary to operate the cars, and labor will have to be paid, and the rate of wages will have to be determined either by mutual consent or by some outside authority, like an arbitration board. But, as we said last week, the whole tendency of arbitration boards in labor disputes is to compromise. Either the board exactly "splits the difference" between the rates proposed by either side or it declares in favor of some intermediate scale between the two schedules presented to it for consideration. The practical result of the action is serious because the company rarely, if ever, goes before the arbitration board with an offer of less than the existing wages while the demands of the men are always for a large increase over the existing wages, undoubtedly with the expectation of a compromise decision. The consequence is that the rate of wages is constantly going up. Where is it to stop?

Recent decisions of arbitration boards avowedly ignore as essential factors in establishing a reasonable wage both the financial ability of the company to pay higher wages and the existing conditions of the labor market. The former principle was distinctly stated in the Bay State Street Railway award as published in our issue of June 26, and in the Chicago decision, testimony that plenty of labor could be secured at the existing wages and that they were 50 per cent higher than those paid in many of the skilled trades in Chicago, as well as higher than those paid for the same work in other American cities where the cost of living was greater, made no difference in that award. Even if one should admit, for the sake of discussion, that the increase given in Chicago was warranted, what is to prevent the use of the same arguments (or lack of arguments) to justify another increase of the same amount at the end of the contract period provided arbitration is followed and a compromise verdict only is rendered. This *reductio ad absurdum* of the situation only emphasizes the importance in all arbitration cases of some method which will secure a decision on the merits of the case.

Some suggestions may be obtained from the experience of the steam railroads which have been through a somewhat similar experience in their wage adjustments with the various brotherhoods, but as they are interstate corporations, federal influence and legislation have been important factors in the methods employed and the results obtained. The first most important federal legislation on the subject was the Erdman act. This act provided for two permanent mediators, the commissioner of labor and the chairman of the Interstate Commerce Commission, who were empowered to settle the matter by mediation if possible, but if they found this beyond their ability, they had authority to appoint the third member of an arbitration board if the contending parties could not agree on one. This general plan was duplicated in 1913 by the Newlands act, which also provides for mediation by a federal government board but with three members, or, if the board is not successful in settling the controversy, of an arbitration board selected much like that under the Erdman act, except that if both sides prefer it can consist of six members, two representing each side and two to be impartial.

The practical workings of all of these methods, as well as of the Canadian Industrial Disputes Board and of compulsory arbitration in New Zealand, were discussed in a paper at the last meeting of the American Economic Association by Professor Dixon of Dartmouth, who gives his preference to a permanent federal mediation board acting somewhat under the procedure followed by the Canadian Industrial Disputes Board. The method of selecting "arbitrators" will be mentioned later. According to Professor Dixon, mediators and arbitrators in wage disputes should be experts not only

in the questions involved, but with experience in the proper procedure in the cases which come before them. From such men mere compromises should not be expected. Moreover, from the successful experience with mediation, as administered by Judge Knapp and Dr. Neill under the Erdman act, he expects more successful results than if there was entire dependence upon arbitration.

Of course with any permanent board everything depends upon the personality of the officials engaged. The chief objection to a permanent board, according to Professor Dixon, is the fear of the employers that it will "get into politics" and of the employees that it would fall into the hands of the employing class. He admits that it is natural to expect that any permanent body of arbitrators would quickly become unacceptable to one side or the other or both, but mentions with seeming approval the suggestion of Professor Shortt of the Canadian Civil Service Commission, who has served as chairman of a number of railway arbitration boards, that three or four persons be named by the government as constituting a panel of eligible persons from which the chairman of each board must be selected. Nevertheless he hopes, also from the experience of Canada, that the "investigators" could often bring about a settlement without resort to arbitration. They should, as under the Canadian plan, have the power to forbid strikes and lockouts during the period of investigation, and the publication of their findings should be an important influence on public opinion. In conclusion, he emphasizes the importance of some sort of co-ordination between such a board and the Interstate Commerce Commission so that rates, if necessary, could be increased to compensate for increased wages.

It is obvious that a plan such as outlined is much more easily adapted to interstate roads and a federal form of government than to intrastate roads and a number of state governments. Nevertheless it is helpful to know the evolution through which steam railroad arbitration has passed as well as the directions in which it has broken down and in which developments may be pending. It would probably be unwise to attempt to add the duties of wage regulation to the state public service commissions, but in an industry in which the amount paid for salaries and wages is 60 per cent of the total operating expenses, as in the electric railway business, there should certainly be a very close connection between the wage schedule and the rates permitted to be charged, and increases in the former should be reflected in the latter. Finally any way in which the merits of wage disputes can be brought before the public and in which the responsibility for excessive wages can be transferred in part to the public would be a step in the right direction. We believe that with a properly educated public opinion in regard to the merits of such a case there would be much greater willingness on the part of the public to put up temporarily with the inconveniences of a strike provided there was general conviction that the railway company was right in its contention and that the wages paid were adequate for the work performed.

WHY NOT FIX RAIL-WEAR LIMITS?

In our study of the economics of girder and high T-rail renewals, printed elsewhere in this issue, we were led to conclude that to put this problem on a scientific basis, wear limits for the various rail sections must be arbitrarily fixed. While most engineers will agree with this conclusion, difficulty is certain to be experienced in arriving at the allowable per cent of head reduction. Misapprehension regarding the effect of this probably will exist because many will construe the fixed limit of wear as the amount all rail must be worn before it is economical to renew it. Such a conclusion is incorrect, however, since the only purpose of suggesting a limit of wear is to put the economics of rail renewals on a definite basis. Reference to the empirical formula in the article on rail renewals printed elsewhere in this issue, as well as to the curves comparing the annual cost of renewals on a fifteen and thirty year maximum life basis, should indicate the urgent need of fixed wear limits. This formula was designed to test the economy of making rail renewals, and unless rail-wear limits have been fixed, the remaining wear life of any section under investigation cannot be determined.

Some engineers may think that the limits of wear suggested for the three general types of rail sections are excessive, but computations, on both the fifteen-year and thirty-year bases, show that if the limit was 50 per cent, rail renewals would be economical at 33 1/3 per cent head reduction, and if the limit was 60 per cent, renewals should be made when the head has been reduced 40 per cent. Certainly this amount of wear is not excessive, in fact some engineers have adopted these percentages as the limits of rail wear. On the other hand, one must not lose sight of the fact that these curves do not take into account all the factors which may affect the economy of rail renewals. In other words, the conclusion should not be drawn that rails must be renewed when a certain percentage of the head is worn away. Track maintenance may not increase, joint renewals may be unnecessary after the periods assumed, and, finally, heavier and more expensive new rail may be used. If any or all of these factors are present, the curve representing the annual cost of the old rail would not intersect that for new rail at the point indicated. Moreover, limits of rail wear even greater than those suggested seem warranted since the girder strength certainly is not impaired by the amount of head reduction in percentage which this formula would permit.

In summing up we believe that rail-wear limits can and should be arbitrarily fixed for all rail sections and that such limits should only be governed by two factors, safety and economy. Rail-wear limits determined on this basis will permit the economy of renewals to be calculated within reasonable limits. This is all the more important because the present small margin of profit in the street railway business demands scientific management of the strictest kind and the magnitude of the rail investment warrants special attention to its economical use.

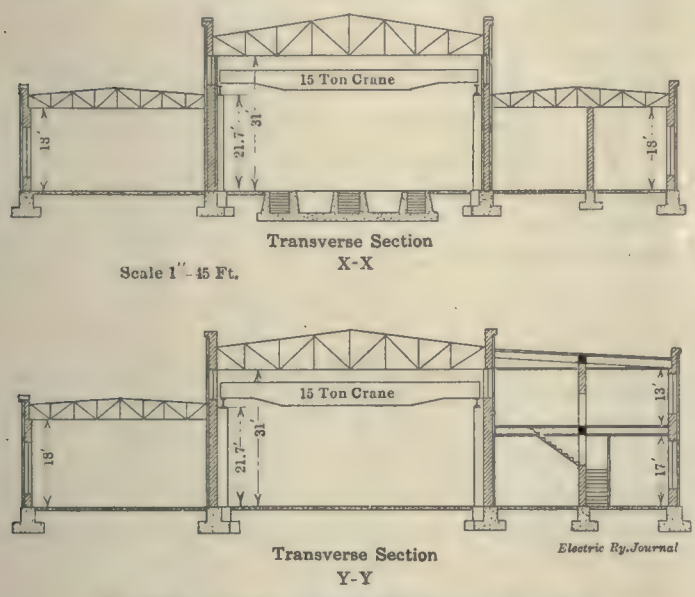
Monroe (Tex.) Maintenance Shops

The Southern Traction Company's Shops at Monroe Handle Both 600-Volt City and 1200-Volt Interurban Cars—The Equipment Permits Much Manufacture to Be Carried On

The new Monroe shops of the Southern Traction Company are up to the high standard of this road, a general description of which was published in the ELECTRIC RAILWAY JOURNAL of July 4, 1914. They are modern in every respect. The best engineering practice has been used throughout, and a number of original ideas have been incorporated in their design.

LOCATION

The shops are healthfully situated 4 miles south of Dallas on Trinity Heights. The pleasant location of the shops has helped draw to them some of the most desirable workmen in the community. The prevailing southern breezes blow directly through the main aisle, which runs north and south. Shower baths, wash basins, toilets and lockers are provided for the workmen. Most of the men live in Oak Cliff, a suburb of Dallas, fifteen minutes' ride from the shops, on the Southern Traction line. Though Oak Cliff is a very desirable place, with cheap rent and low cost of living, several of the workmen have built homes at Trinity Heights, within walking distance of the shops.



MONROE SHOPS—CROSS-SECTIONS OF SHOP

The Monroe shops are situated at the meeting point of the Dallas-Waco and Dallas-Corsicana divisions, so that disabled cars may be brought in quickly for repairs. It is also conveniently located with respect to the Texas Traction Company line, which has a terminus in Dallas and which, together with the Southern Traction Company, are under the control of the Strickland-Goodwin Management Association. All heavy repair work to Texas Traction cars is done at the Monroe shops.

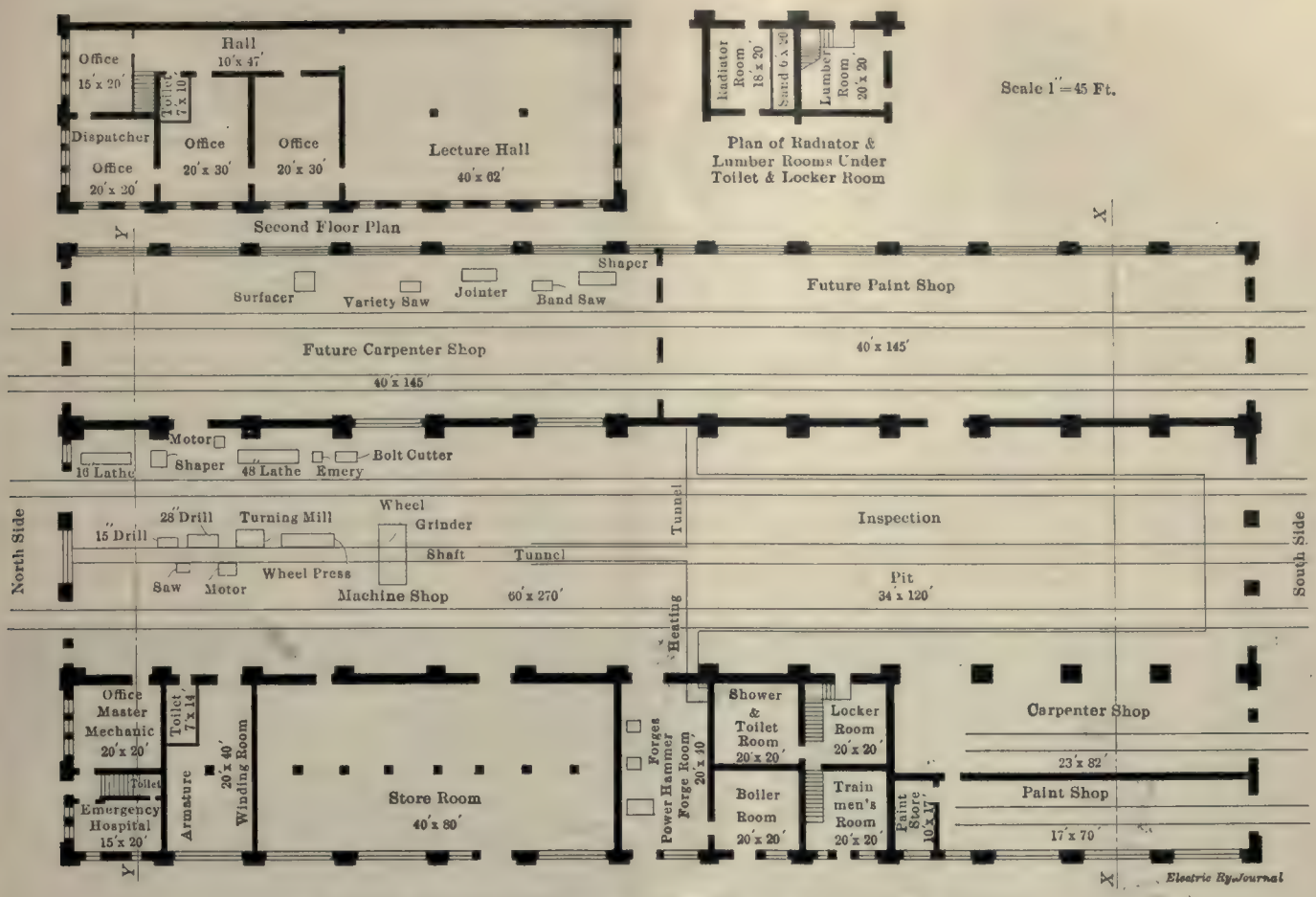
Before passing on to a general description of the shops themselves, the protection of the main line and work tracks may be considered. One loop track connects all shop tracks with the main line, which is protected by a switch and short track which would send a runaway car up a slight incline and stop it against a pile of soil. All of the work tracks are protected by Hayes' derails.

GENERAL CONSTRUCTION AND LAYOUT

The shop building is 275 ft. long by 105 ft. wide. The main bay, as stated above, runs north and south. Built of red brick with white concrete cappings and trimmings, the edifice presents a pleasing appearance. The main division walls are of brick, and expanded metal lathing makes the other walls nearly flameproof. All ground floors are of cement. The wooden roof, with tar and gravel covering, and the inflammable contents of the building are well protected by numerous fire hydrants (with hose) located in the building, while a 50,000-gal. steel water tank furnishes water at 70-ft. head.

The west wing of the building, as shown on an accompanying drawing, has two stories. On the upper floor are three general offices, a lecture hall 40 ft. x 62 ft., and a dispatcher's office—the last being located in

MONROE SHOPS—LINE OF MACHINE TOOLS IN MAINTENANCE SECTION



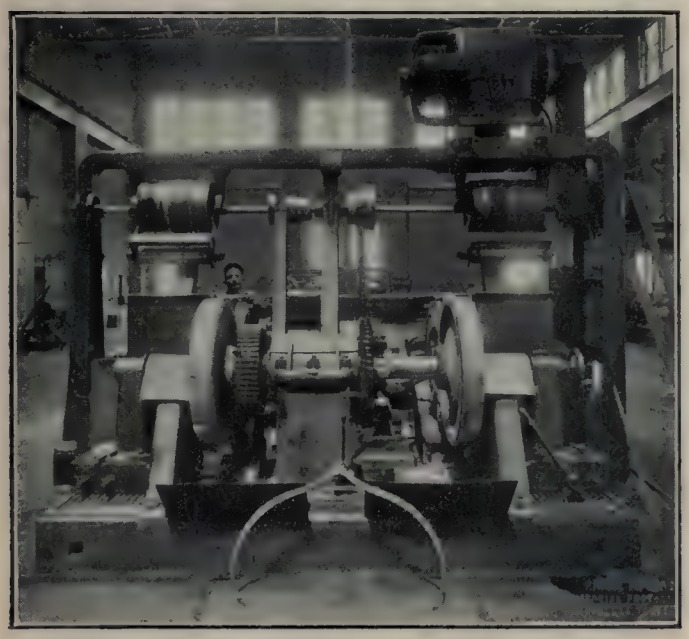
MONROE SHOPS—GENERAL PLAN WITH MACHINE TOOL LAYOUT

the southwest corner where a full view of the main tracks is obtainable.

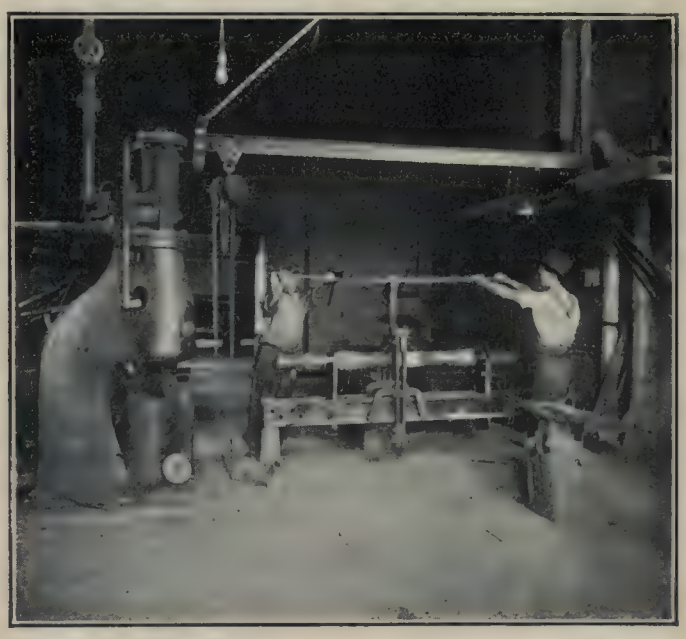
On the lower floor are the offices of the shop foreman and of the superintendent of equipment. Situated also on the lower floor of this wing are the storeroom, the armature winders' room, the blacksmith shop, the boiler room, a trainmen's room, the carpenter shop and the paint shop. Each shop is separated from the others and from the main bay by brick walls and Durand's tin-clad fire doors.

The storeroom is 40 ft. wide by 80 ft. long, and contains 1000 bins arranged in six double tiers. The blacksmith shop contains two Buffalo forges, fitted with forced draft and suction hoods, the centrifugal fans being electrically driven. The blacksmith shop also contains a 400-lb. Chambersburg hammer operated with air at 90-lb. pressure. The illustration on this page shows a home-made axle straightener and a home-made jib crane, the latter fitted with a ½-ton Yale & Towne hoist.

The carpenter shop is fitted with a 12-in. patent column hand planing and jointing machine, one variety saw with boxing and hollow chisel mortising attachment and with arbor arranged to receive gaining head, one



MONROE SHOPS—WHEEL GRINDING OUTFIT



MONROE SHOPS—STRAIGHTENING AXLE IN FORGE ROOM

single-cylinder surfacer, one 36-in. band saw, one double-spindle shaper, one swing cutoff saw, and one knife grinder and knife balancing machine. Group belt drive is employed. The entire carpenter shop machinery comprising equipment from the J. A. Fay & Egan Company, is run by one 50-hp, three-phase, 2300-volt motor. Natural overhead light is supplied by three wire-glass skylights, each 4 ft. 2 in. wide by 15 ft. long.

In the paint shop, light from above is furnished by two skylights, similar to those in the carpenter shop; and the shop is further lighted on the west side by fourteen windows, each 3 ft. 4 in. x 11 ft. 2 in. Twelve similar windows light the storeroom.

The main aisle or bay is 273 ft. long, 60 ft. wide by 31 ft. from the cement floor to the bottom members of the structural steel trusses which support the roof. These trusses are a combination of the Warren and Pratt types with the top cord slanting to accommodate the roof which slopes from the center toward the sides; these trusses are spaced 21 ft. throughout the length of the aisle. To prevent the trusses from bulging sideways, there are provided three lines of cross bracing, running the entire length of the bay. The high winds that frequently occur in northern Texas make necessary this extra strong roof support.

LIGHTING

The main aisle is lighted by a row of 8 ft. x 3-ft. 8-in. windows, 22 ft. from the floor. These windows extend almost completely around the aisle, there being 103 in all. A few 3-ft. 4-in. x 11-ft. 2-in. windows, 4 ft. 2 in. from the floor, are also provided in the bay near the lathes and mechanics' benches. The aisle is lighted from directly above by five 6-ft. 5-in. x 15-ft. 6-in. wire-glass skylights. The system of natural lighting is found very effective and satisfactory.

Illumination of the main aisle by night is accomplished with ten inclosed arc lamps, hung staggered, in two rows; the globes are on a level with the lower members of the roof trusses to put the arcs out of the direct range of vision for the workmen. Condulet sockets to accommodate incandescent lamps with extension cords are provided wherever close work or inspection under cars is necessary. The artificial illumination of the shop has been found satisfactory.

INSPECTION PIT AND MACHINE SHOP

Three tracks run the entire length of the main bay. The southern half of the aisle is given over to an inspection pit, 34 ft. wide by 120 ft. long. All rails passing over this pit are supported by 12-in. x 12-in. wooden joists, which rest on concrete posts, spaced every 10 ft. The pit is 4 ft. 10 in. deep; the floor is of concrete 12 in. thick. Two sets of concrete steps, one at each end, afford entrance to the pit. Wooden floors have been put in between tracks and on a level with the rails.

The northern end of the bay is occupied by the machine shop. This contains one 16-in. Lodge & Shipley lathe with patent head and 11-ft. bed, one McCabe 2-in. 26-in.-46-in. lathe with 8-ft. centers used chiefly for turning axles and large commutators and occasionally for wheel work; one 22-in. Ohio machine tool shaper, one single-head bolt threader, one grindstone and an emery wheel. These machines are run as a group, through jackshaft and belts, by a 15-hp. d.c. motor. In another group are one 15-in. and one 36-in. Barnes drill press, one 11½-in. Higley cold metal saw with automatic adjustable feed, one 40-in. Bullard boring mill, and a 260-ton Caldwell wheel press. This group is run by a 15-hp, 110-volt, a.c. motor, the jackshaft and motor being located in a concrete pit which is covered by concrete flags. The machine shop also contains one German-made combination splitting shear and punch sold by Henry Pels & Company, New York, and is provided with a riveting hammer and air drill. A Norton wheel grinder driven by a 35-hp, 550-volt, d.c. motor forms an important part of the machine shop equipment.

A 15-ton Box crane, driven by three d.c. motors, serves the entire main aisle, running on rails located 21 ft. 8 in. above the floor. A system of pipes and valves serves all the shops with air at 90-lb. pressure, from a 48-in. x 12-ft. air tank and a 100-cu. ft. air compressor driven by a 20-hp, 550-volt, d.c., series-wound motor. A pipe has also been run over to the Monroe substation, 300 ft. away, where the air is very effectively used in cleaning the machines.

MONROE SHOPS—BABBITTING JOURNAL BRASSES; INTERIOR VIEW OF MACHINE SHOP, SHOWING CRANE

Girder and High T-Rail Renewals

A Summary and Discussion of Existing Practice, the Factors Influencing the Rate of Wear and the Wear Limits, and the Derivation of a Formula to Test the Economics of the Problem

BY EXUM M. HAAS, ASSOCIATE EDITOR ELECTRIC RAILWAY JOURNAL

A wide diversity exists in the practice of making renewals of girder and high T-rail in paved streets. Some railways insist upon strict economy in this regard, while others are grossly extravagant. The diminishing profits of the industry make scientific economy in all departments of utmost importance, but especially in track work, since it represents about 40 per cent of the total plant cost. Traffic conditions obviously will govern the period of renewals, but it is a moot question as to when rail is worn out. This uncertainty is due largely to the fact that wear limits for the different rail sections have not been adopted, although there is no practical reason why one cannot be fixed arbitrarily for each rail section. It may be that this limit would never be reached in service, because of the many other factors entering into the problem, but the mere fixing of a wear limit would place the economics of rail renewals on a definite basis.

Whenever a track appraisal is undertaken the engineer is confronted with the problem of determining the percentage of depreciation. At best, most of these determinations are guesses, based either on the experience of the engineer who makes the appraisal or on precedents set by previous valuations. On some appraisals as large a figure as 8 per cent per annum has conservatively been assumed as the rate of track depreciation, and records indicate that the minimum rate used in any valuation is about 4½ per cent. Information recently obtained after an exhaustive analysis of rail wear in one of the large cities in this country tends to show that an average of thirty-one years of wear life could be obtained. This average wear life, however, was based upon a conservative limit of rail wear which has in some cases been exceeded without affecting track economy.

Existing Practice

There is little or no standard practice regarding the limits of wear for the various types of girder and high T-rail. Most engineers who have a definite rule believe that with grooved-girder and tram-girder rails, the limit of wear has been reached when the wheel flanges ride on the floor of the groove or tram. Limits of wear fixed for T-rails are usually based on steam-road practice, or on limits adopted in some important valuation. Perhaps the Boston Elevated Railway has gone as far toward fixing a definite limit of wear for T-rails as any other electric road in the country. Conditions governing the life of T-rail on open elevated structures with high-speed trains, however, are not analogous to the conditions in paved streets where speeds are comparatively slow. The application of steam-road practice to electric railway tracks in paved streets is also in utter disregard of the economics of the problem at hand and results in most extravagant track-maintenance methods. Generally speaking, street railways cannot afford to use relay rails, except in temporary work, on account of the expensive construction employed and the difficulty experienced in making repairs. Some relay rails, however, have been taken from heavy trunk lines and laid in extensions of light traffic lines. Usually such practice is economical only if undertaken at the time of pavement renewals.

Perhaps present-day practice in making appraisals of tracks and in calculating their depreciation is nowhere more typically set forth than in the 1906 report of the Chicago Traction Valuation Commission. In this, track was divided into two parts: the rail and the substructure. Rail depreciation was determined by three principal factors: the wearing life in the head of the rail, the condition of the tram and the condition of the joints. Joints were depreciated on the basis that to obtain the full value in the head of the rail, joint renewals would be necessary. Where the tram was broken the rail wear-life limit was considered as reached regardless of the remaining life in the head of the rail. The wear limit of the rail head was considered as reached when it had been worn away so that the height of the head above the floor of the groove or tram was ⅝ in. or less. With this wear limit fixed, the remaining wear value of the rail was readily determined. Enough measurements of the worn rail head were taken to obtain an average. The ⅝-in. limiting dimension was governed by the depth of the standard wheel flange. In other words, the wear limit was fixed at the point where the standard wheel flanges rode on the floor of the groove or tram.

Changes in Rail Sections Increase Wear Life

Since that time new rail sections have been developed in which metal has been added at points where it was needed to prolong the life of the rail. In some cases the limiting factor of the life of the rail has been railway traffic, in others vehicular traffic, in still others corrosion. Provision has been made for these and other factors which might influence the serviceability of the rail in the later sections. The general adoption of the girder-grooved rail as a substitute for the old tram rail with the horizontal wagon-wheel tread is certain, except under extraordinary conditions, to eliminate vehicular traffic as a life-determining factor. The shape of the groove also makes flange riding less hazardous, and the depth of the groove, in many sections, insures a liberal wear value in the head of the rail.

Grooves, correctly designed, should be of sufficient depth to permit maximum head wear before the standard wheel flanges ride on the groove floor. The introduction of rolled-steel wheels, however, has obviated flange riding as a limiting condition. Comparatively few wheels in service are new, and even a short period of wear increases the wheel-flange depth appreciably. As a result of this, even if the groove depth were correctly designed, one could conceive of rails worn so that all wheels except the new ones would be flange riding. Obviously, wheels worn to the extreme allowable flange depth would ride before the others.

The latest types of girder-groove sections provide a liberal groove width and an angle so that they are self-cleaning. The tendency of one wheel of a pair to wear to a thick flange and the other to a thin flange, as well as for both wheels to wear to thin flanges, results in more or less flange cutting on the lips of the rail groove. Accordingly, the lips of the groove have been made heavier to provide against excessive wear of this kind. Likewise, provision has been made for wear on the gage side of the head due to wheel conditions and the

nosing of the trucks by moving the center of the head more nearly over the center of the web, thereby increasing the horizontal thickness of the head. Some companies (Chicago, for instance) have designed a rail section with additional metal under the head opposite the gage line. This insures a maximum horizontal as well as vertical head reduction before the rail is ready to be scrapped.

Other provisions against the factors which may limit the life of rails include a liberal bevel on the pavement side of the rail head. This not only avoids false treads when narrow wheels run on the track but allows a head area above the normal pavement surface. Some engineers have claimed that the limit of wear will be reached when head of the rail is worn below the original grade of the pavement, and that, consequently, a wear limit based upon any greater percentage than this would allow would be impracticable. Experience seems to indicate, however, that where railway traffic is dense, vehicular traffic also is sufficiently dense to wear down the pavement in advance of the rail. On the other hand, this extra rail-head area above the surface of the pavement insures that at least until the first pavement renewal is made the surface of the rail head will not be below that of the pavement.

In some localities the rapid deterioration of the rail web and base, due to corrosion, determines the life of the rail. Rail corrosion advances very rapidly in some districts, particularly where the drainage conditions are good and the tracks are laid on streets with rather steep grades. This is due principally to oxidization of the steel caused by frequent changes from wet to dry, conditions such as would occur where good track drainage obtains. Here, of course, the life of the rail is not determined by the head, and an increase of the metal in the webs and bases offers the only recourse.

Undoubtedly changes in the chemical composition of rails and in the methods of manufacturing them have improved their wearing qualities. Experience has shown that open-hearth steel rails wear longer than those manufactured by the Bessemer process, and in addition the former have a higher resistance against corrosion. Improvements in the methods of manufacture which have resulted in a more uniform quality and a finer grain have also had a tendency to lengthen the wear-life of rails. On the other hand, modern methods of production under pressure have to a certain extent offset the benefits which should have been derived from improvements in manufacture and changes in chemical composition. An increase in the carbon content has tended to lengthen the wear life of rails. Perhaps the best evidence that changes in chemical composition do improve the quality of the rails is to be found in the service records of titanium-treated rails. While it is possible that other alloy steel rails may produce the same results, actual service data are not available. Apparently rail corrugation which was introduced with the more rigid types of track construction has been eliminated or at least greatly delayed by the titanium treatment. In addition the structural properties, as well as the wearing qualities of the rail, have been improved.

Effect of Joints, Ties and Foundations

Although the introduction of the welded and riveted joints has had a tendency to reduce joint difficulties in track, the old adage, "The life of the joint is the life of the rail," still holds, but to a greatly reduced degree. The additional support given to mechanical joints by the modern foundation construction also has made them less of a determining factor than in the earlier types of track laid in paved streets or in open-track ballasted construction. As long, however, as rail is not made continuous across the joint and a line is perceptible where the rails butt together, it will be impossible to eliminate cupping at that joint. The application of the grinder to insure perfect rail surface on new track and to eliminate evidences of cupping at joints as soon as they appear, is certain to reduce the importance of the joint as a determining factor.

The type of tie used has little effect on the life of rails, although it undoubtedly has some bearing on the problem. Some engineers are of the opinion that the wooden tie, being more resilient than the steel tie, decreases the rate of rail wear, particularly where both are laid in solid concrete. Where soft wood ties are used without tie plates, they may affect the character of wear on the rail. Instances may be cited where rail has canted on soft ties to such an extent as to change the angle of wear on the head. Moreover, mechanical wear on the soft ties may force rehabilitation, which in turn might make rail renewals necessary in advance of the time dictated by rail wear or other track conditions.

If one may draw a conclusion from the rate of rail wear as found in ballasted open-track construction and in paved streets, it would be that the rate of wear on resilient construction is much less than that on rigid construction. If that is a test, then ballasted construction in paved streets should make rails wear longer than solid-concrete foundations. This is a point, however, upon which opinions differ, and strong evidence can be submitted in support of both sides of the question. On the other hand, the permanent types of track foundations have given added importance to the problem of making rail renewals. If there is any economy in the expensive permanent types of construction, and undoubtedly there is, it ought to be practicable to renew rails without any change in the foundations except with possibly some slight repairs. If no more life is to be obtained from foundations of this expensive construction than from those of cheaper construction their use should be discontinued. Experience with the improved types of foundation construction, however, indicates that they will outlive one set of rails. Renewals on old permanent foundations have been made, and will continue to be made, if the foundations have been properly designed and installed.

Character of Pavement

Probably no other factor is more important in considering the economics of rail renewals than the character of pavement. In districts where vehicular traffic is reasonably heavy, it is probably safe to say that the modern permanent types of track construction will outwear the pavement. Accordingly, when pavement renewals are contemplated the engineer must determine the remaining life of the rail and whether it will be economical to permit the rail to remain in service. With the large investment in the plant and the small margin of return allowed to railway companies at the present time, this question should be decided on a strictly engineering basis. In other words, if the pavement is to be renewed and the remaining wear value of the rail is such as to make it economical to leave the rail in the track until it is worn out, mere sentiment should not govern the final decision.

Grades and Drainage

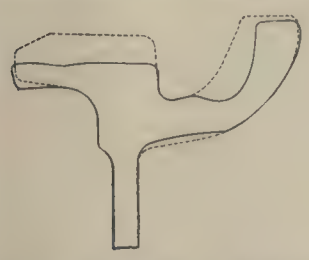
Single track laid on heavy grades wears more rapidly than single track on the level. Similarly, track on ascending grades in double-track construction wears more rapidly than track on descending grades. This is largely due to the unusual tractive effort necessary which may be accompanied by spinning wheels on sanded track. Drainage on grades is not so important, but on level track it is of vital moment and will deter-

mine the life of track foundations. Manifestly, failure in the track foundation has an important bearing on the rail-renewal problem.

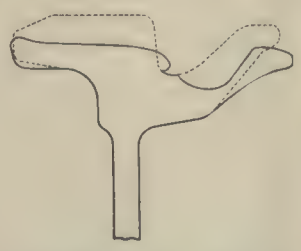
FACTORS AFFECTING THE RATE OF RAIL WEAR

Obviously the density of traffic, both railway and vehicular, determines rate of rail-head wear. Closely related to these two are the type and weight of the rolling stock, whether single or double truck, light weight or heavy. The total weight of the car is not so important, but the weight per wheel is of moment, the rate of wear being directly proportional to the weight per wheel. The kind of wheels, whether rolled steel or chilled iron, as well as the wheel contour, determine the character of wear. When wheel flanges ride on the floors of the groove or tram, some engineers consider that the wear-life limit of the rail has been reached. Others go so far as to permit the wheel flanges to shear the lip off completely before the rail is considered worn out.

If the track is otherwise in serviceable condition, the



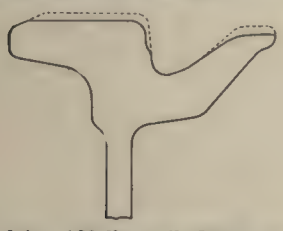
9-in. 145-lb. guard rail from curve in Chicago. Original section installed in 1908 and removed March, 1915. Head reduction 44.1 per cent.



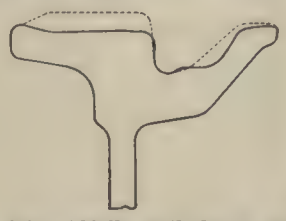
9-in. 129-lb. rail from curve in Chicago, original section installed in 1908 and removed March, 1915. Head reduction 44.5 per cent.

9-in. 129-lb. rail from curve in Chicago. Other end of rail shown in the cut at the left. Original section installed in 1908 and removed March, 1915. Head reduction 46.6 per cent.

9-in. 145-lb. guard rail on curve in Chicago. Original section installed in 1908 and removed March, 1915. Head reduction 46.9 per cent.

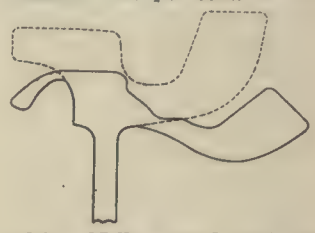


9-in. 129-lb. rail from tangent in Chicago. Original section installed in 1908. Templet taken March, 1915. Note vehicular wear on lip. Head reduction 12.8 per cent.



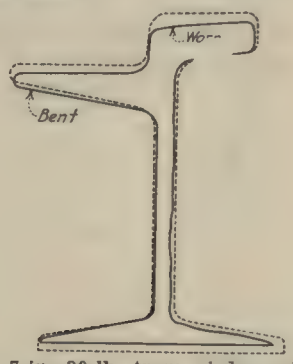
9-in. 129-lb. rail from tangent track in Chicago. Original section installed in 1908 and templet taken April, 1915. Note wear due to canted trucks. Head reduction 29.0 per cent.

6-in. 97-lb. guard rail laid on a slight grade on a 100-ft. radius curve; 22 lb. per yard worn off or head reduced 56.0 per cent.

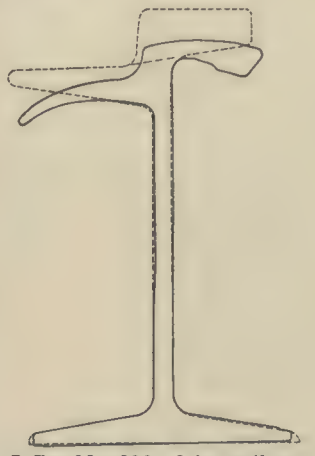


6-in. 97-lb. guard rail on curve; 0.0 grade; 23.7 lb. per yard worn off or head reduced 76.6 per cent.

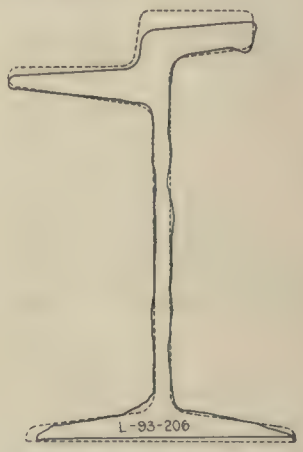
6-in. 97-lb. guard rail on a 60-ft. radius curve; 0.0 per cent grade; laid 1902, measured 1910. 49.4 lb. per yard worn off or head reduced 66.1 per cent.



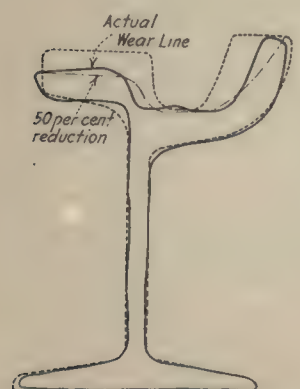
7-in. 80-lb. tram girder rail from Milwaukee laid in 1898 and removed in 1914. Note head and tram wear. Reduction due to corrosion, causing renewal. Head reduction 28.5 per cent.



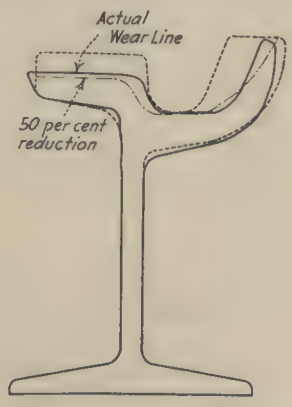
L.S.—93—206. 9-in. rail removed after twelve years of service. Joints showed same head reduction. Head reduction 49.3 per cent.



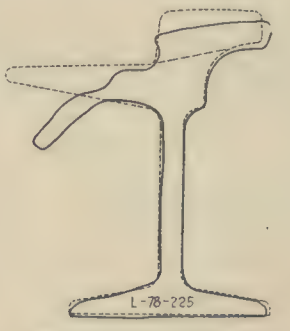
L.S.—90—206. Taken out of track in Toledo, Ohio. This rail was laid on a sand foundation twenty-one years ago. In good condition except reduction in web due to corrosion. Head reduction 38.2 per cent.



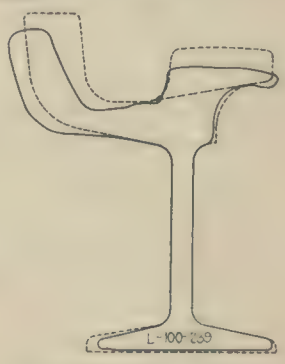
Inside guard rail L.S.—398 —7 in. 108 lb. per yard. Head reduction 50.6 per cent.



L.S.—6—398, 7-in. 108-lb. rail. Same rail as shown in the cut at the left. Section taken by sawing rail from end. Head reduction 39.2 per cent.



L.S.—78—225. 6-in. rail removed from macadam street after fourteen years' service. Joint failure cause of removal. Head reduction 19.7 per cent.



L.S.—100—239, worn out guard rail taken from 40-ft. radius curve, which carried 150 cars daily for twenty-one years. Head reduction 40.7 per cent.

SECTIONS OF WORN RAILS FROM DIFFERENT ROADS, SHOWING HEAD REDUCTION (¼ size)

tremendous investment in the modern types of track as compared with the small investment in wheels, should dictate the turning down of the wheel flanges to eliminate them from the realm of limiting factors. From the standpoint of safety there is no objection to the practice where rolled-steel wheels are used, because their flanges do not chip, and when these wheels begin to become flange bearing, the deep flanges wear off so that the wheels are soon equally flange and tread-bearing. Experience in the past with chilled-iron wheels seems to indicate that it would not be good practice to allow them to ride on the flanges. However, a change in the shape of the wheel flange might permit this practice so that the mere fact that chilled-iron wheels were used would not make them a limiting factor in the rail-wear life. Even with chilled-iron wheels, the problem should be determined on a safety-of-operation basis rather than simply because the flanges are riding. In cases of this kind it might be economical even to change the shape of the wheel contour to permit the rail head to wear to its limit.

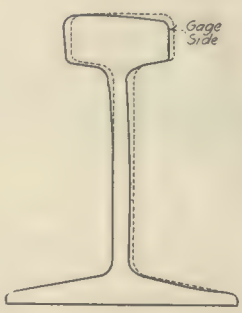
The rate of speed is of vital moment, and for track in paved streets it is safe to assume that the speeds are comparatively low. In other words, they are not comparable with open track on an elevated structure, nor with track on a private right-of-way. But as low speeds reduce the stresses in the rail it appears reasonable to draw the conclusion that the limit of wear for rail in paved streets may exceed that for rail in open-track construction. Since conditions are not analogous, the practice on steam railroads, interurban railways or elevated railways should not be an index of rail renewal requirements in paved streets. Moreover, the large investment in the types of track construction used in paved streets is sufficient reason to induce the prudent engineer to make every effort to obtain long wear life.

Rapid acceleration and braking increase the rate of rail wear. Equipment maintenance, particularly as regards the condition of the trucks and wheels, also affects the wear life of rails. The flexibility of the car springs and the ease of movement of the side bearings, so far as they affect the position of the trucks and wheels in relation to the rails, also affect the rate of wear. Wheel maintenance in particular is important, as well as the selection of wheel contours which insure a distribution of the load across the full width of the head. Where flanges are permitted to wear unusually deep, wheels may become flange riding long before they should. When flange riding occurs it results in wear in the groove and when the groove is worn through the wear-life limit of the rail should be considered as reached. It is, therefore, important that the limiting depth of the flange should be within reason. Some question has been raised concerning reduction in electrical contact on flange riding track, and this, too, is important in obtaining economical power consumption. On the other hand, the mere fact that the electrical contact is not good should not determine the life of the rail, but should dictate better wheel maintenance.

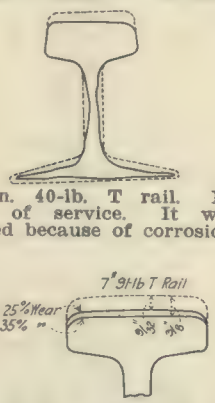
Other Factors Affecting Rate of Rail Wear

Numerous other elements have a minor bearing on the rate of rail wear, such as the cleanliness of the streets, the weather, the amount of snow and ice, and

3¾-in. 45-lb. T rail, laid in Milwaukee in 1890 and scrapped because of corrosion.



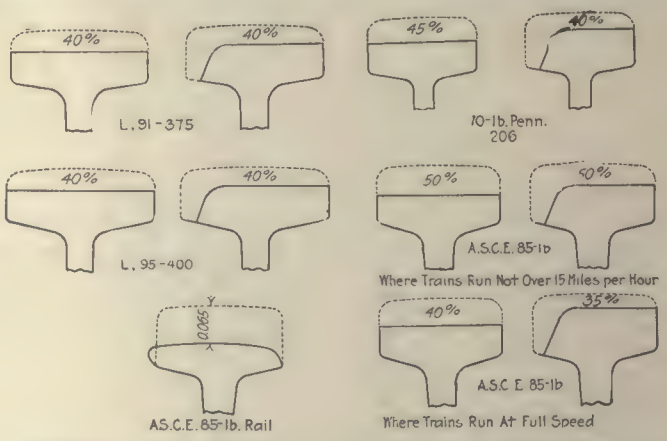
6-in. 60-lb. T rail laid in Milwaukee in 1898 and removed in 1914. Note bend in web probably due to heavy cars and lack of tie rods.



3½-in. 40-lb. T rail. No record of service. It was scrapped because of corrosion.

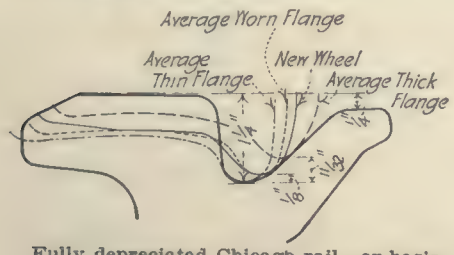
7-in. 91-lb. T rail. L.S.—375. Left-hand section shows line of symmetrical wear; right-hand section shows actual wear; from Twin City Rapid Transit Company.

5-in. 80-lb. T rail. I.S.—8004. Left-hand section shows line of symmetrical wear; right-hand section shows actual wear; from Twin City Rapid Transit Company.

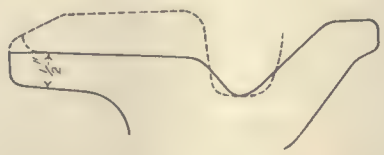


Allowable wear of T rails before renewal on the Boston Elevated Railway.

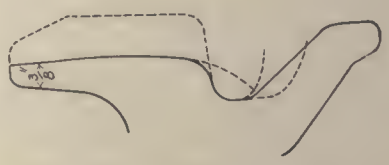
SECTIONS OF WORN RAILS FROM DIFFERENT ROADS, SHOWING HEAD REDUCTION (¼ size)



Fully depreciated Chicago rail—on basis of flange bearing.



Fully depreciated Chicago rail—on basis of new wheel profile with flange riding in bottom of groove.



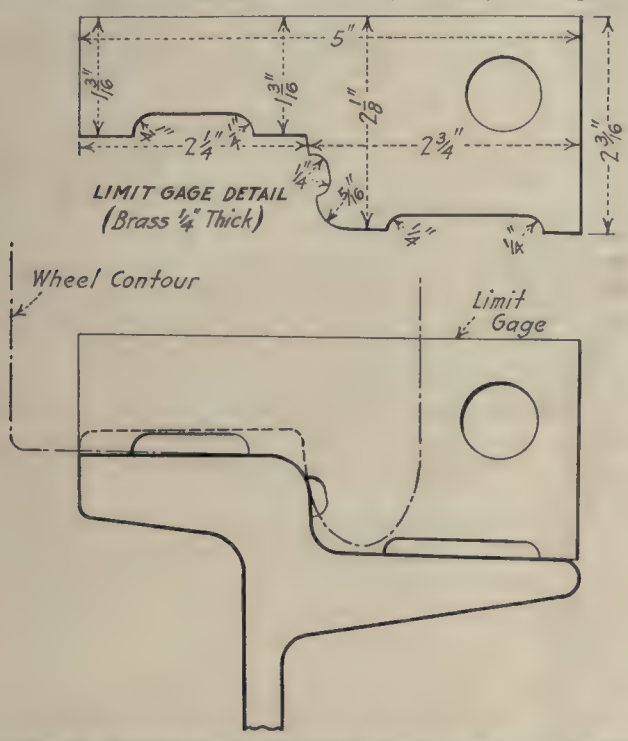
Fully depreciated Chicago rail—on basis of worn wheel profile with flange riding in bottom of groove.

SECTIONS OF FULLY DEPRECIATED CHICAGO RAIL (⅛ size)

street sprinkling. Lack of cleanliness causes a collection of grit on the rail which increases the rate of wear. Frequent alternation of wet and dry periods increases the rate of corrosion and produces slippery rails, making the use of sand necessary. Both the corrosion and use of sand increase the rate of wear on the rail head. During winter months the amount of snow and ice is also important, because in some cities it is necessary to use great quantities of salt which gives impetus to both the rate of corrosion and wear. The amount of snow and ice also increases the number of slipping and grinding wheels, although these are of minor importance in influencing the rate of wear.

MUNICIPAL REQUIREMENTS

In many cities railway companies are usually required to renew their track when changes in the grade or the line of streets are made. When changes like these kinds are contemplated the problem resolves itself into one of track economics, together with what character of construction future traffic will demand. These elements enter into most any rail-renewal problem, consequently



RAILWEAR ECONOMICS—LIMIT OF WEAR OF L. S. 95-297, ADOPTED BY INDIANAPOLIS TRACTION & TERMINAL COMPANY (½ size)

the decision must depend upon the engineer's previous experience, as well as his ability to anticipate traffic conditions. It seems reasonable to assume that he may make these determinations within safe limits, yet how well it is done depends largely on the human equation. It is believed that rail renewals in cases of this kind do not deserve as serious consideration as the character of foundation to be employed. With the more permanent types of foundations it is safe to assume that rail renewals may be made without disturbing the foundation. If the alignment or grade is changed a loss is entailed in the investment, because the original foundation cannot be used. In contrast with this the rail may be used in the new line or on the new grade or transferred to an entirely new location. These considerations also enter in changes from single to double track.

THE ECONOMICS OF RAIL RENEWAL

When pavement renewals become necessary or the foundations, ties or joints have failed, the question is usually whether it is economical to use the old rails in the new work. This problem must largely be governed by local conditions and in specific instances. Before the economy may be determined, however, it is necessary to assume some wear-life limit. With a limit fixed the remaining life of the rail may be estimated readily by obtaining the average head reduction for the period the rail has been in service. With this information in hand the rate of wear per year may be ascertained and the remaining life estimated. When this has been done the condition of the joints, ties and the foundation should be carefully examined, as well as the extent of corrosion and the condition of any other part of the structure which may have a bearing on the remaining life of the rail. If the amount of corrosion indicates that it may limit rail life in advance of wear, the rate may be determined in a manner similar to that employed in calculating the rate of head wear.

If the foundation must be rebuilt or if the ties must be renewed, they increase the cost of the installation and may show that it would be uneconomical to use the old rail. The condition of the joints, whether good or in need of repairs or requiring that a permanent type be substituted for the mechanical joint, affects the economy of renewal. When the problem can be decided solely on the basis of economics, it resolves itself into one of balancing interest, depreciation and maintenance of the new rail against the old. The following factors must enter the problem to obtain the comparative annual cost between the old rail and the new:

R_2 = Total cost of new rail, joints and fastenings in place in dollars.
L_2 = Total estimated wear life of the new rail in years.
M_2 = Annual maintenance cost of the new rail in dollars.
P = Annual interest and taxes on the new rail in per cent.
V_r = Remaining wear value of the old rail in dollars.
S = Scrap value of the old rail in dollars.
K = Cost of replacing the old rail in dollars.
T = Cost of tearing up and relaying the pavement, including labor and material, in dollars.
M_1 = Annual cost of maintaining the old rail and fastenings in dollars.
L_1 = Remaining wear life of old rail in years.
X = Money in dollars expended to prolong the life of rail which could not be charged to maintenance (betterments).
C_2 = Annual cost of the new rail in dollars.
C_1 = Annual cost of the old rail in dollars.

From the foregoing factors the annual cost if old rails are used would be:

$$\frac{V_r + K + T + X - S}{L_1} + M_1 = C_1.$$

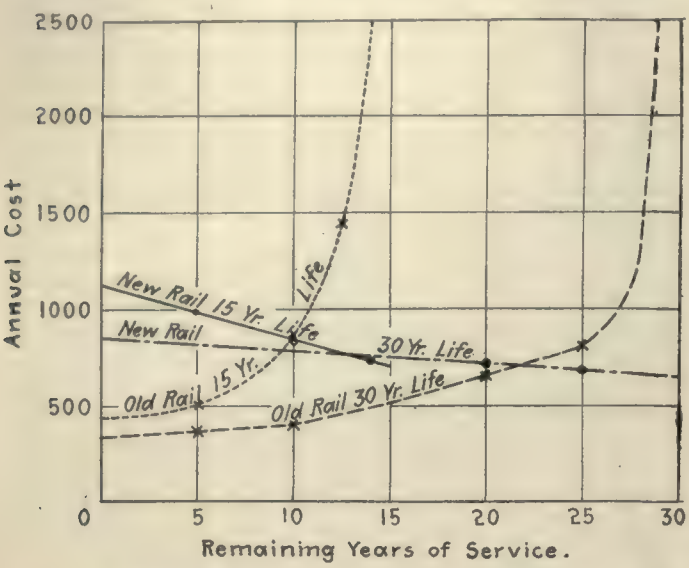
The total annual cost if new rails are substituted for the old ones at the time repaving is done, is as follows:

$$\frac{V_r + R_2 - S}{L_2} + (R_2 - S)\,P + M_2 = C_2$$

To determine the relation between the annual cost of a mile of new rail as compared with a mile of old at the different ages of the old in service, the following values per mile of single track have been given to the various items contained in the formula:

R_2 = \$6000 (including rail and fastenings).
M_2 = \$100.
P = 8 per cent.
V_r = \$2000.
S = \$1200.
K = \$2000.
T = \$1000.

For the different ages of rail V_r will naturally change. It was also assumed that the new rail was of the same section and of the same cost as the old rail. Although there may be some slight change in the scrap value at the different periods, it was allowed to remain the same in the calculations. The annual cost of maintaining the old rail, or M_1, was increased 50 per cent for the fourteenth year and 25 per cent for the twelve and one-half year period. After the ten-year period, it was also



30-Year Basis	15-Year Basis
M_1 = \$100 from 1 to 19 years	M_1 = \$100 from 0 to 12½ years
M_1 = \$125 from 20 to 24 years	M_1 = \$125 at 12½ years
M_1 = \$150 from 25 to 28 years	M_1 = \$150 at 14 years
M_1 = \$200 from 29 to 30 years	X = \$440 at 10, 12½ and 14-year periods
X = \$450 at the 20, 25 and 29-year periods.	

RAILWEAR ECONOMICS—ECONOMY OF RAIL RENEWAL TESTED BY COMPARISON OF ANNUAL COST OF NEW AND OLD RAILS ON A FIFTEEN-YEAR AND A THIRTY-YEAR MAXIMUM WEAR-LIFE BASIS

assumed that new joints would be necessary on all the old rail. On the assumption that 60-ft. rails were used, an amount of \$440 was added to the cost per mile for joints. Similar assumptions also were made in determining the relation between the annual costs of new and old rail on a thirty-year basis. The results of these calculations for the different periods are indicated by the graphs shown in the accompanying diagram. No general deductions may be drawn from these curves since they apply only to the cases in hand. The method employed, however, is applicable to any case, and the terms of the formula are sufficiently general to determine the economy of making rail renewals under all conditions.

CONCLUSIONS

In the foregoing discussion an endeavor has been made to consider every phase of the rail-renewal problem. As a result of this analysis the following conclusions seem warranted:

1. Rail renewals in straight track are seldom necessary because the head has been diminished by wear sufficiently to reduce the structural strength of the rail so that it will not carry cars safely. Light sections on which considerable wear has occurred, however, may be too weak structurally to be safe or economical under an increase in the weight of rolling stock.

2. Better chemical composition, the addition of extra metal where most wear occurs, improvements in the methods of manufacture, lighter cars and training of motormen in the proper method of acceleration and braking have tended to increase the wear life of rails.

3. The more substantial and expensive track foundations now being laid in paved streets, as compared with the earlier types of construction, make more life from the new types necessary if they are economical. Hence, it should be possible to make rail renewals without disturbing the foundation.

4. Joint failures or cupped rail at joints, followed by destruction of the foundation beneath them, are the most important factors in limiting the life of rails. A high standard of construction and maintenance in this respect is certain to delay renewals due to these causes, and it is quite possible that defects of this kind may be made of secondary importance.

5. In districts with heavy vehicular traffic, pavement renewals rather than failures in the track, force engineers to consider the economy of rail renewals.

6. In districts where vehicular traffic is light, rail renewals are largely governed by foundation, tie or joint failures.

7. The large investment in track in paved streets as compared with the small investment in wheels makes rail renewals uneconomical simply because wheels are flange bearing, unless this condition actually makes operation unsafe.

8. The head cross-sectional areas available for wear in most high T-rails are greater than those of girder-grooved and girder-tram rails.

9. The present practice of making rail renewals on an arbitrary headwear limit basis is in general uneconomical, since the ultimate limit of head wear for most sections, both girder and high T-rails, is seldom, if ever, reached.

10. Ultimate permissible wear limits for the standard rail sections of the American Electric Railway Engineering Association should be arbitrarily fixed, if for no other reason than to simplify calculations of the economy of making renewals.

11. For girder-grooved sections, a 50 per cent head-reduction limit appears to be an entirely reasonable one to adopt, although it will be safe to allow more than this on some sections.

12. For shallow-head high T-rails it appears safe and reasonable arbitrarily to fix the wear limit at 50 per cent head reduction.

13. For the A. R. A. and A. S. C. E. rail sections an allowance of a 60 per cent head reduction is believed to be within safe limits.

14. Unless a rail renewal is required by ordinance the relative economy of using new rail or relaying the old rail should be carefully calculated when pavement renewals are made. With these data in hand engineers will have a strong argument for adhering strictly to the economics of the problem.

15. This study finally leads to the conclusion that the rate of rail wear varies with localities, with streets and even as between blocks. For appraisal purposes an average life may be determined for a given property, but this average should not be applied in depreciating track on any other property.

Coupon Transfer at Exposition Grounds

In connection with the handling of travel to the Panama-Pacific Exposition the United Railroads of San Francisco built a loop terminal at Van Ness Avenue between Francisco and Bay Streets. Passengers who enter this terminal pay fare to a station collector and receive a transfer with a coupon attached. As the passenger proceeds he hands his transfer to a checker who tears off the coupon upon which both date and serial number are printed. This coupon is dropped into a box and serves later to check the cash receipts. The portion of the ticket returned to the passenger is the company's standard transfer form.

Skip-Stops in St. Louis

The United Railways, in Its Application Before the Public Service Commission for Permission to Eliminate Car Stops, Replies to Criticisms of Proposed Plan

The brief that has been presented by the United Railways Company of St. Louis before the Public Service Commission of Missouri in connection with its recently-proposed skip-stop plan states that both in this country and abroad the endeavor has been, as territorial expansion in large cities has increased, to shorten the time of transportation for passengers. It then submits the plan, which is outlined in the following paragraphs, to the end that the whole people of the city of St. Louis may be better served, more quickly transported from their places of residence to their places of business, and vice versa.

About 7000 stops are now made in the operation of the street railway system in the city, and of these stops it is proposed to eliminate some 720. This will permit a saving of time that would be required in the slowing up, stopping and starting of cars at those points, and with the same general speed as is now maintained, it is estimated that from four minutes to five minutes will be saved on every line.

The selection of the stops to be eliminated has been made with reference to their present non-usage or the scarcity of passengers presenting themselves for passage, together with the minimum amount of additional walking distance to be imposed by virtue of the increased distance between stops. Stops are to be made in a systematic manner at alternate streets. At every point where cars stop, a red sign with "Cars stop here," or the equivalent, will be posted, and places where the cars do not stop will be indicated by a blue sign with appropriate letters.

Some idea of the immeasurable benefit that this plan will bring to those who ride upon street cars is obtained when it is considered that the United Railways Company now carries about 1,000,000 passengers per day. Assuming that 25 per cent or 250,000 of these passengers save five minutes per trip, a saving of 20,866 hours per day is made, and if the value of this saved time is estimated at the low rate of 10 cents per hour, the value of the time saved is $2,086 per day, or $625,980 for the 300 working days constituting the year.

To this proposal of the elimination of these 720 stops some twenty specific objections were lodged, covering twenty different stops. During the course of an early hearing a committee was appointed by all represented at the proceedings to make an inspection of the stops to whose omission specific objection was made and to report its findings to the Public Service Commission. In this report no general objection is lodged to the whole scheme but rather an approval of the plan. However, the particular stops could be retained if this is found desirable without affecting the whole plan materially.

In addition to the objections to particular non-stop points, there have been some half-dozen general objections to the scheme as presented in its entirety. These objections have come from a labor organization, an association known as the People's League, and one or two individual objectors, of whom one is not a resident of the city of St. Louis.

Criticism of the proposed plan can be classified as follows: (1) Some passengers would be required to walk further; (2) there will be a diminution in real estate values at the affected corners; (3) at the eliminated stopping points the speed will be too great, causing more accidents; (4) the company will get the principal advantage of the plan by reason of its ability to take off cars.

As to the first criticism, it has been shown in evidence that the average increased walking distance is about 300 ft., and that this affects only the persons living in the immediate vicinity of the eliminated stops, a comparatively small number. At the rate of 4 m.p.h., which is the average walking rate, 300 ft. will be covered in less than one minute. There can be little hardship in this short walk, and those making the walk will participate in the saving of time due to the elimination. In all large cities where rapid transit obtains, the stations are from three to four blocks apart, this being four and five times the distance between stops in the present proposed plan.

As to the diminution of real estate values, owners of real estate at the different corners have no vested interest in the operation of street railway cars. Their interests are at all times subordinate to the interest of the general public in its transportation facilities. A real estate owner cannot oppose his interest to the interest of the majority of the people. Whether or not street cars will continue to be operated in front of his property is a matter of chance, not of right. But aside from this question the diminution of real estate values is merely a surmise prompted by an overcautious imagination, as there seems to be no real reason why real estate should diminish in value either as to business or as to residential locations.

As to excessive speed, the speed of the cars passing over the non-stop points will be no greater than at any of the other places along the route. The evidence shows that even now one-fourth of the cars passing certain points do not stop at that point either for the reception or discharge of passengers. Therefore, the same condition that obtains now in practice will be put into effect in a more systematic manner.

As to the claim that the company will reap some financial advantage, the complainants have attempted to show that since the time for making the trip will be reduced the company will thus be enabled to give the same service with fewer cars and that there will be a saving in power and in wear and tear upon the cars. If this is true, it is a very urgent reason why the plan should be adopted. No one is bettered by economic waste.

Of course, there is no disposition on the part of the United Railways Company to do anything which would decrease riding on its cars. Its only hope for success is to use such methods as will increase its patronage, which can only be done by appealing to the convenience, pleasure and necessity of its patrons. It considers that in eliminating the stops, it would be doing something to save time of the great majority of its customers. The convenience of the public is its first and only consideration. If this proposed elimination is put into effect the speed at the non-stop points will not be any greater than at present. The time that will be saved will be that consumed in making the proposed eliminated stops.

The following letter from Peter Witt, Commissioner of Street Railways for the city of Cleveland, to Richard McCulloch, president United Railways of St. Louis, was submitted to show the attitude of the people regarding skip-stops in the former community:

"Replying to your letter in reference to the car-stop elimination, I am inclosing several [popular ballot] cards, which will show you the method employed here to put this plan in effect. The votes on every line showed a majority for the change, ranging from three to one on the short lines, to eleven to one on the long lines. We eliminated 47 per cent of the stops. The average distance between stops is 800 ft. We cut the time per

half-trip from two to eleven minutes. The only trouble we met with was from the property owners whose interests were affected. The car riders themselves registered no kicks, and so successful has been the plan that I am positive when I say to you that were we to go back to the old way with the slow time, the kicks and complaints would be many."

Comment in the recent report to the city of Detroit by Barclay Parsons & Klapp regarding the elimination of stops was also cited as follows: "In the earlier days of horse-car service it was not unusual for passengers to expect the cars to stop midway, or even at irregular intervals, along the block to suit the convenience of each individual householder or storekeeper. As the distances became greater and the demand for more rapid service grew, the rule of stopping only at corners became necessary. * * * It is now recognized that rapid transit conditions affect such a large proportion of the traveling public that the inconvenience of the few, in walking short distances or in changing cars to complete their trip, is not only warranted, but necessitated by the growing density of traffic on the highways of our large cities."

Pennsylvania Overhead Line Crossing Specifications

This Subject Has Received the Exhaustive Attention of a Committee Appointed in November, 1914—The Specifications Are Divided Into Nine Sections

As reported by R. P. Stevens, president Mahoning & Shenango Railway & Light Company, to the Pennsylvania Street Railway Association at its May meeting, a joint committee representing the different classes of utilities in interest has prepared for adoption by the Public Service Commission of Pennsylvania, a set of specifications covering the construction at crossings of overhead lines of public utilities. Mr. Stevens was the chairman of the committee of the association on a uniform crossing agreement. The specifications are the work of a committee appointed as a result of a conference held on Nov. 16, 1914, at Harrisburg at the request of F. Herbert Snow, chief of the bureau of engineering of the Public Service Commission. As a result of the discussion at the meeting the following committee was appointed: S. M. Viele, Pennsylvania Railroad; D. B. Heilman, Philadelphia & Reading Railway; J. S. Jenks, West Penn Traction Company; R. P. Stevens, Mahoning & Shenango Railway & Light Company; R. E. Chetwood, Western Union Telegraph Company; J. F. Skirrow, Postal Telegraph-Cable Company; Nathan Hayward, Pennsylvania Bell Telephone Company; J. F. Stockwell, Keystone Telephone Company of Philadelphia; Thomas Sproule, Philadelphia Electric Company; G. E. Wendle, Lycoming Edison Company, and Paul Spencer, United Gas Improvement Company, chairman. Beginning Dec. 1, 1914, meetings were held weekly in Philadelphia until the specifications were completed. In the work the committee had the assistance of a number of other experts.

As stated by the committee, the specifications are intended to cover crossings of overhead conductors of any utility and the overhead conductors of any other utility, or the tracks and right-of-way of railroads. They are, as far as possible, complete for all types of conductors and cover definitely the general requirements at the points of crossings, without stating the type of construction in such specific details as to limit it to any particular method. In its work the committee took under consideration other similar specifications, including those adopted by the National Electric Light Association in 1911, which specifications were, with certain revisions, later adopted by the American Electric Railway Association; the specifications recently adopted by the Idaho Public Service Commission; those of the Illinois Public Service Commission and the Oregon Railroad Commission; the act relating to electrical construction, of the State of Washington; the specifications of the Pennsylvania Railroad and of the Association of Railway Telegraph Superintendents; the regulations of the Swiss government in reference to electrical installations, and the specifications established as standard practice of the *Verbandes Deutscher Elektrotecknikker.*

The new specifications, which, with appendices, cover 165 pages of the size of those used in the A. E. R. A. engineering manual, are divided into nine sections covering the following subjects: (1) Definitions and classifications; (2) construction of power lines up to 5000 volts on crossing communication circuits and power lines up to 15,000 volts when crossing other power lines, also communication lines crossing over communication lines; (3) construction of power lines of over 5000 volts, crossing over communication lines and of power lines of over 15,000 volts when crossing other power lines; (4) "collinear" construction, that is, construction of one line parallel with an existing line, but on separate supports, and so placed in reference to the other that one line will be wholly or in part over the other; (5) construction of communication-line crossings over railroads, based upon specifications of the Association of Railway Telegraph Superintendents; (6) crossings of power lines of all voltages over railroads; (7) construction of overhead lines where crossing under railroad bridges; (8) underground construction at railroad crossings, and (9) appendices containing sag tables and diagrams, wood-pole specifications, various diagrams of line construction details, a method of calculating the strength of double cross-arms, tables of allowable working unit stresses in line construction, details of a typical crossing of a power line over a railroad, and tables of minimum clearances and of wind and ice loads.

From what has been said it is apparent that the recommended specifications contain a wealth of data and that unusual attention has been paid to definitions. The latter is especially important in the case where the recommendations will be used in formulating commission orders.

"The Best Country Bus Route"

The latest recruiting appeal to be issued by the London General Omnibus Company takes the form of a striking and original form of panel bill as illustrated.

This slip, the color scheme of which is a tasteful black, yellow and light blue, is now being brought prominently

RECRUITING PLACARD ON LONDON BUSES

before the notice of London's countless thousands by being displayed conspicuously on the "General" buses, with the result, it is hoped, of further stimulating recruiting and impressing the public at large with the great need there is for an adequate supply of men.

Improving Station Surroundings

When Allen & Peck, Inc., took over the operation of the Annapolis Short Line in 1912 the new management found that the vicinity of the station was hardly in consonance with the fine Colonial atmosphere which makes Annapolis a pleasing reminder of the past. A number of tumble-down buildings not only obscured the view of the near-by Court of Appeals, but gave the approach to the station a most uninviting appearance. It was therefore decided that the rental from the shacks could well be dispensed with as a contribution to civic improvement. The structures were torn down and replaced with turf and flowers with the results illustrated.

Thus the opening of "Short Line Park" not only cleared away several old unsightly buildings but virtually placed the Short Line on one of the main streets of the city and within a block of the group of State buildings. The improvement was in line with the rehabilitation of the Short Line, which included all new passenger equipment consisting of center-entrance all-steel cars, and change in motive power from a.c. to d.c.

ANNAPOLIS SHORT LINE—SCENES LIKE THIS WERE NO ATTRACTION FOR TRAVELERS

ANNAPOLIS SHORT LINE—THE WORTHY FOREGROUND OF MARYLAND'S COURT OF APPEALS TO-DAY

ANNAPOLIS SHORT LINE—A FORMER VIEW OF MARYLAND'S COURT OF APPEALS

ANNAPOLIS SHORT LINE—AN ELECTRIC RAILWAY'S MITE TOWARD THE CITY BEAUTIFUL—VIEW LOOKING TOWARD THE ANNAPOLIS TERMINAL TO-DAY

ANNUAL CONVENTION SAN FRANCISCO OCTOBER 4 to 8, 1915

American Association News

ANNUAL CONVENTION SAN FRANCISCO OCTOBER 4 TO 8, 1915

Excellent Progress Is Being Made on the Program for the Convention—Booklets on the Itineraries of Convention Tours Are Being Distributed by Mr. McConnaughy

CONVENTION PROGRAM PROGRESS

While it is still too early to give details of the program excellent progress is being made. A decision has been tentatively made to hold the American Association meetings in the morning and those of the affiliated associations in the afternoon.

Acting on local advice the executive committee has decided to hold the meetings in the building of the Native Sons of the Golden West located at 414 Mason Street. This building is the center of the hotel district and is admirably adapted for convention purposes. The original intention was to hold sessions at Inside Inn.

THE CONVENTION TOURS

As announced on the "Association News" page last week, the itineraries of the convention tours have been distributed. They are contained in attractive booklets appropriately bound in red and blue respectively, the colors corresponding with the titles of the special tour trains. The booklets contain the complete schedules and much interesting information concerning the points to be visited en route. Even photographs of the special trains are included. The "Red Special" booklet is issued with the imprint of the New York Central Lines and the "Blue Special" booklet with that of the Pennsylvania Railroad. The text of both booklets shows that the most scrupulous care has been exercised in providing for every detail of convenience and comfort of the tourists. Both booklets are beautifully illustrated and contain maps in colors. Both contain the schedule of the "White Special," the one-way train, which leaves Chicago on the evening of Oct. 1, reaching San Francisco on the morning of Oct. 4.

Supplementing his statement, quoted last week, H. G. McConnaughy, director of transportation, states that copies of the booklets will be sent to all those who ask for them, such having been already sent to company members of the American and Manufacturers' Associations and to those who requested copies in advance. He directs attention particularly to the arrangement of stops on these tours, which have been designed to minimize tediousness. In the cities through which the special trains will travel the American Association is planning, at the request of the local railway companies, a series of meetings and entertainments which will make the tours an important part of the convention. Mr. McConnaughy predicts that every member who makes this trip and attends the convention will return with new ambitions, new ideas and new knowledge sufficient to return the investment tenfold. He thinks that the opportunity to absorb the spirit of the West, to test its hospitality and to examine its engineering achievements alone are worth the cost. He waxes enthusiastic over the beauties of the expositions at San Francisco and San Diego, quoting Edwin Markham's description of the former as follows: "I have seen to-night the greatest revelation of beauty that was ever seen on earth. I say this, meaning it literally and with full regard for all that is known of ancient art and architecture, and all that the modern world has heretofore seen of glory and grandeur. I have seen beauty that will give the world new standards of art and a joy in loveliness never before reached. This is what I have seen—the courts and buildings of the Panama-Pacific Exposition illuminated at night."

In closing Mr. McConnaughy directs attention to the notes under the heading "Resourcefulness," which appears on the front page of the *Brill Magazine* for June, raising the query as to the number of resourceful men that are in the railway association and implying an important connection between resourcefulness and attendance at the convention.

ENGINEERING ASSOCIATION STANDARDS COMMITTEE

A largely attended meeting of this committee was held in New York on July 29 and 30 to review the work of the technical committees for the year. The members present were: H. H. Adams, Chicago, Ill., chairman; C. F. Bedwell, Newark, N. J.; C. H. Clark, Cleveland, Ohio; W. G. Gove, Brooklyn, N. Y.; J. H. Hanna, Washington, D. C.; C. S. Kimball, Washington, D. C.; F. R. Phillips, Pittsburgh, Pa.; A. S. Richey, Worcester, Mass.; Martin Schreiber, Newark, N. J., and J. W. Welsh, Pittsburgh, Pa. E. B. Katté was represented by H. A. Currie, New York, N. Y. There were also present by invitation R. C. Cram, Brooklyn, N. Y.; W. E. Johnson, Brooklyn, N. Y.; A. B. Stitzer, Philadelphia, Pa., and Frank Kingsley and H. H. Norris, ELECTRIC RAILWAY JOURNAL. Secretaries E. B. Burritt and C. W. Stocks also attended the sessions.

The committee considered in detail the recommendations of the technical committees in so far as they affect the association standards and a number of valuable reports were adopted for approval by the association. The material submitted to the committee showed that a remarkably fine year's work had been done and the engineering manual will be greatly enriched by the results.

Street Railway for Canton, China, Proposed

The construction of a street railway system in Canton is being considered by the provincial authorities, reports Consul George E. Anderson, Hongkong, China, and plans have been drawn for a line connecting the stations of the Canton & Hankow Railway and the Kowloon-Canton Railway, running through a populous section of the city.

The proposed line is projected by General Lung, Military Governor of Kwangtung Province, in connection with Chinese capitalists in Hongkong, and the plans call for the construction of a little less than 6 miles of street railway along a route which will permit the use of a considerable portion of the old wall of Canton. It is proposed to construct the line by means of a company for which the provincial government will furnish half the funds.

Plans for the rolling stock are not yet complete, but the general idea seems to be to buy motors and steel parts of cars abroad, completing the cars in Canton or Hongkong, present high freight rates rendering the purchase of complete cars abroad at this time a matter of difficulty. It is thought that the line as projected can be started with an initial outlay of about $100,000.

COMMUNICATIONS

Specifications for Gears and Pinions

THE METROPOLITAN WEST SIDE ELEVATED RAILWAY COMPANY

CHICAGO, ILL., July 26, 1915.

To the Editors:

I have been interested in the paper on "Railway Motor Gearing" read by W. L. Allen before the last meeting of the Central Electric Railway Association, an abstract of which was given in the ELECTRIC RAILWAY JOURNAL for June 26, page 1201, and in the further remarks by Mr. Allen in the issue of July 17, page 111.

On the Chicago Elevated Railroads very little trouble has been experienced from the breakage of gears, but pinions have caused considerable trouble. As a rule gears remain in service until the wear on the teeth makes their removal necessary. Pinions show widely varying results, some failing shortly after being placed in service and some giving very long life. As reliability of service and elimination of failures were far more important than the value of a few pinions we adopted the policy of installing new pinions at each general overhauling (approximately every 75,000 miles) whether the pinion removed showed any appreciable wear or not. Even this did not eliminate failures on the road, as some pinions failed before making the general overhauling mileage.

We believe that buying gears and pinions under specifications and testing each order will assist in working out a specification and in developing a material which will stand up under the requirements of heavy service. The specification will give us something to work toward. If the first specification does not prove satisfactory, changes can be made. The records of the chemical and physical characteristics of the material and method of treating different lots of pinions will enable the railway companies and the manufacturers to intelligently follow the problem until it is satisfactorily solved.

H. A. JOHNSON, Master Mechanic.

THE CAPITAL TRACTION COMPANY

WASHINGTON, D. C., July 28, 1915.

To the Editors:

I have read with interest W. H. Allen's paper on "Specification for Gears and Pinions" in the issue of the ELECTRIC RAILWAY JOURNAL for July 17.

In the last few years the untreated gears and pinions have to a large extent been superseded by two classes of gears and pinions which may be properly classified as "heat-treated" and "case-hardened." When the untreated material was in general use several of the larger companies had specifications for the purchase of gears and pinions, but, so far as I have been able to find out, none of the railway companies have specifications for either the heat-treated or case-hardened gears and pinions, although several companies are preparing specifications at this time.

This was one of the subjects assigned the equipment committee of the American Electric Railway Engineering Association, and a preliminary specification has been prepared to be presented at the convention in October. In the preparation of this specification the committee had the assistance of the manufacturers, and I am informed that they would welcome a reasonable specification. In preparing a specification at this time the question of treatment should be left to the manufacturer and the physical properties which the product is to have after treatment should be specified. The development of the high-grade gears and pinions has been so rapid that it is only reasonable to expect that they will continue to improve and that a specification prepared at this time will have to be revised from time to time.

In my opinion there is no reason for not having specifications for gears and pinions, but some standard specification should be adopted that could be followed by all the manufacturers.

The purchase of gears and pinions to specification would increase the cost if the specification required the manufacturer to change his method. Care should therefore be taken to prepare a specification that would secure a satisfactory material and not impose any unnecessary hardship on the manufacturer.

The manufacturer would not be relieved by the specification from responsibility for breakage or poor wear, but wherever such did occur an investigation would locate the trouble. Although I am not a manufacturer, I must admit that the manufacturer is not responsible for all of the broken or badly-worn gears. The care of the equipment has much to do with the life of gears and pinions.

As this is a subject of considerable interest at this time, the equipment committee of the American Electric Railway Engineering Association would appreciate the assistance of the members in preparing a standard specification for gears and pinions that could be used by all the member companies. If a standard is adopted it will be an advantage to the manufacturer as well as to the purchaser, and if properly prepared its use should not increase the cost, but might, on the contrary, reduce it.

R. H. DALGLEISH, Engineer of Equipment.

Cause of Thick and Thin Wheel Flanges

BUFFALO, LOCKPORT & ROCHESTER RAILWAY COMPANY

ROCHESTER, N. Y., July 20, 1915.

To the Editors:

In an article published in your issue of May 29, 1915, page 1037, over the signature of M. M. Lloyd of Des Moines, the statement is made that "the principal cause of thick and thin flange wear on rolled-steel wheels is the difference of the wearing quality of the metal in the wheels." In this connection it seems only fair to call to the attention of your readers the conclusions of last year's committee on equipment, along the same line of investigation.

On page 280 of the 1914 proceedings of the American Electric Railway Engineering Association, in the report of the committee on equipment, the committee states: "While the number of wheels included in the reports was not large enough to serve as a basis for any general conclusions, a surprising lack of positive evidence on this point was manifest and the figures seemed to show, so far as they showed anything, that there was not sufficient justification for a strong insistence on mating by carbon content." This conclusion was reached after the examination of records of a comparatively small number of wheels taken at random from among records of service of several thousand wheels of all manufactures. The complete lack of uniformity of performance of wheels of similar chemical composition led to the conclusion above quoted, and it would not be too much to say that any chemistry falling within the limits of the standard specifications of the association has been shown to give good service."

Mr. Lloyd's statement "That it is possible to delay wearing of sharp flanges by checking up the trucks for square and by taping the wheels to be sure that the diameter is exactly the same" seems to contain the real kernel of demonstrated truth in the matter.

The writer has personally known of a number of

cases where phenomenally large mileage was obtained by calipering the wheels without removing them from the car, and placing abrasive brakeshoes against the larger wheels. These experiments, while comparatively few in number, nevertheless seem to demonstrate very clearly that if the two wheels on one axle could be kept at exactly the same diameter throughout their life, and further assuming that trucks were in square and that track curvature was approximately the same in both directions, the wheels could be worn to the limit of wear groove without necessity of turning on account of sharp flanges.

The manufacturers of wheels have done a great deal to perfect their product and have shown a very open-minded policy in dealing with the American Electric Railway Engineering Association, as well as the individual users of wheels, and it would seem that in common justice to them the chemistry and method of manufacture of wheels should not be held responsible for results which are in practically all cases due to the mechanical practice of the user of the wheel.

JAMES P. BARNES, General Manager.

99.2 Per Cent of Westchester Trains Are on Time

The accompanying table shows the remarkable record for punctuality which the New York, Westchester & Boston Railway has maintained during the last twelve months ending June 30, 1915. These figures are based on the monthly reports submitted to the Public Service Commission of New York, Second District.

It will be seen from the table that the maximum percentage of trains on time for any month was 99.6 per cent in March, the minimum 98.4 per cent in April. The average punctuality for the twelve months was 99.2 per cent. The average lateness in minutes per train run varied from 0.23 minute in April to 0.04 minute in February and March.

It will be noticed that from 64 to 90 per cent of the delays are listed under the column headed "waiting for other railroads." This large proportion is due to delays

Month	Trains Run	Trains Late	Trains on Time	Per Cent on Time	Minutes Late	Av. Minutes Late per Train Run	Average Minutes Late per Delay	Principal Causes of Delay, in Per Cent				
								Equipment	Waiting, Other Divisions	Waiting for Other Railroads	Signals	Other Causes
July '14.	6,319	42	6,277	99.3	351	0.05	9	4	14	64	18	0
Aug....	6,300	88	6,212	98.6	1408	0.22	16	1	8	64	15	12
Sept....	6,113	35	6,078	99.4	370	0.06	10	3	8	86	0	3
Oct	6,320	48	6,272	99.2	409	0.06	8	1	20	79	0	0
Nov....	6,114	65	6,049	98.9	666	0.11	10	1	10	79	0	10
Dec.....	6,320	60	6,260	99 1	734	0.11	12	5	10	68	8	9
Jan., '15.	6,318	51	6,267	99.2	400	0.06	4	2	12	80	0	6
Feb.....	5,706	28	5,678	99 5	234	0.04	8	3	11	83	0	3
Mar....	6,320	24	6,296	99 6	228	0.04	9	0	5	87	0	8
April....	6,109	97	6,012	98.4	1442	0.23	15	1	3	72	0	24
May....	6,315	49	6,266	99.2	694	0.1	14	0	8	90	0	2
June....	6,297	40	6,257	99.4	342	0.05	8	0	5	77	0	18
	74,551	627	73,924	99.2 per cent for year.								

occasioned by the opening of a drawbridge over the Bronx River, where the trains of the New York, Westchester & Boston Railway run over the tracks of the New York, New Haven & Hartford Railroad, a condition over which the mechanical and operating departments naturally have no control.

The next most frequent special source of delays, classified as "waiting, other divisions," is due to delay in the interchange of passengers between local and express trains at East Third Street Station, Mount Vernon, where both classes of trains are regularly scheduled through the day to arrive at the same minute and wait for each other's arrival.

One of the chief causes for the excellent showing in punctuality on the New York, Westchester & Boston Railway is ascribed to the policy maintained of scrupulously examining the defects in equipment or other sources of delay and their causes when they first occur in order to insure that a recurrence of the same kind of a delay will be prevented.

Women Conductors in Glasgow

It is not often that this paper publishes a view of a group of conductors on a transportation system. The accompanying engraving, however, seems to be so interesting as to warrant its publication. A few months ago this paper described the experiment made in Glasgow with women conductors. At first two conductors

GROUP OF WOMEN CONDUCTORS, GLASGOW TRAMWAYS

were put in service, and the result with women has proved so satisfactory that the Corporation Tramways have employed a number of women to take the place of the men who are now at the front during the war. A group photograph of the women conductors employed on the system was taken some time ago, and it is reproduced herewith.

Railway Power Rates in Chicago

On page 138 of the issue of the ELECTRIC RAILWAY JOURNAL for July 24 certain information regarding the operation of the contracts between the Chicago Surface Lines and the Commonwealth Edison Company were published. The prices for energy there quoted, for the years 1910 to 1913 inclusive, were the prices under the old contract. While these were the prices originally paid, the 1913 contract was retroactive and, as adjusted under the new contract, the rates actually paid were as follows: 1909, 0.711 cent; 1910, 0.720 cent; 1911, 0.713 cent; 1912, 0.725 cent, and 1913, 0.742 cent.

Warning to Trespassers

Posters entitled, "Why the Public Should Keep Off the Railroad Tracks," are prominently displayed in the passenger stations of the Michigan Central Railroad. These posters take the form of maps of the railroad system upon which is indicated, by different colored spots, the location of each accident during the year. A key on the poster indicates that spots of one color show that the passengers were injured and spots of another color that the accidents were fatal. The four margins of the poster are taken up by photographs of the different types of trespassers on railroad rights-of-way, and the danger to which they subject themselves.

Equipment and Its Maintenance

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

(Contributions from the Men in the Field Are Solicited and Will be Paid for at Special Rates.)

Some Experiences with Field Control

BY H. M. LLOYD, EQUIPMENT ENGINEER BRITISH COLUMBIA ELECTRIC RAILWAY, VANCOUVER, B. C.

The British Columbia Electric Railway has in operation field control on eleven passenger, three combination and seven express cars operated usually in two or three-car trains, and occasionally in five-car trains, including a couple of trailers. These cars are run almost exclusively on the 64-mile line between New Westminster and Chilliwack. The equipments per car comprise four Westinghouse No. 333-C2 115 to 125-hp. field-control motors geared 20:57. At present the trolley potential is 630 volts, fed from five substations about 12 miles apart, and the minimum voltage is sometimes 400 volts. It is intended, when traffic warrants the change, to raise the potential to 1200 volts.

The car equipment will be readily adapted for this increase in voltage by changing resistance and control connections.

The track over which these equipments operate has a maximum grade of 2.7 per cent and a maximum curvature of 10 deg., but a large part of the track is level and straight.

The running time between New Westminster and Chilliwack for passenger trains with about thirty stops is two hours and forty minutes and for milk trains about three hours. In operating over the line passenger train speed ranges from 20 m.p.h. on grades and curves to 50 m.p.h. or more on level tangents. The field control is used on the heavy grades and during acceleration periods.

In one test a 106-ton train, comprising two motor cars and one trailer, in regular service averaged 7.8 kw-hr. per mile with a maximum draft on the substations of not more than 1000 amp. On the other hand, a similar train of three motor cars with twelve 75-hp. motors of the same gear ratio but without field control required starting currents as high as 1200 amp. to make the same schedule.

The most marked advantage of field control was shown in ascending the 2.7 per cent grade. This grade is about 4 miles long and includes some sharp curves. With the full field the train under test made a speed of approximately 15 m.p.h. while drawing 720 amp. On changing over to the tap field the current jumped to 920 amp., with a consequent drop of line voltage. The resultant speed was only about 18 m.p.h. A heavily-loaded five-car excursion train with three motor cars will average about 10 to 12 m.p.h. up this grade on full field. Thus it is clear that field control increases the capacity of the line.

Another advantageous feature of field control for us is low speed running through rock cuts and around sharp curves. Here we run economically on tap field with the motors in series at about 18 m.p.h., whereas the old control for the same rate of speed would have involved continual cutting in and out and consequent resistance losses.

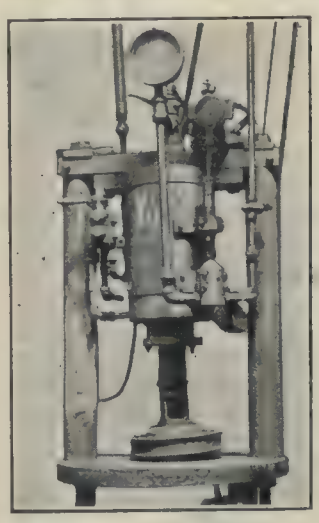
In starting trains with field control the acceleration is also much smoother than without it, the change from series tap field to parallel full field being accomplished without jerking. The low starting speed is found especially useful on milk trains in running up to the milk stands to take on cans.

The maintenance cost of field-control motors and of multiple-unit control is also less than that of other motors because they are not subjected to the strain of excessive starting currents. For the same ton-miles operated the feeder losses and the strain on the substation equipment are correspondingly reduced.

A Hydraulic Bearing-Broaching Machine

BY C. M. FEIST, MASTER MECHANIC SIOUX CITY (IOWA) SERVICE COMPANY

Increased bearing wear averaging approximately 25 per cent more than that for bearings that are simply turned, is obtained by the Sioux City Service Company's mechanical department through the use of a hydraulic broaching machine. While it was designed primarily for this purpose, the machine is also used to press bearings into the solid-bearing type motor housings. After the bearing has been pressed in position a tapered broaching mandrel of the proper size is fitted to the plunger and forced into the bearing. All bearings are babbitted and machined in the usual manner, but in the latter process they are left approximately 1/64 in. under size. After the broaching mandrel has been forced through the bearing the babbitt is condensed so that the diameter is reduced to the correct size.



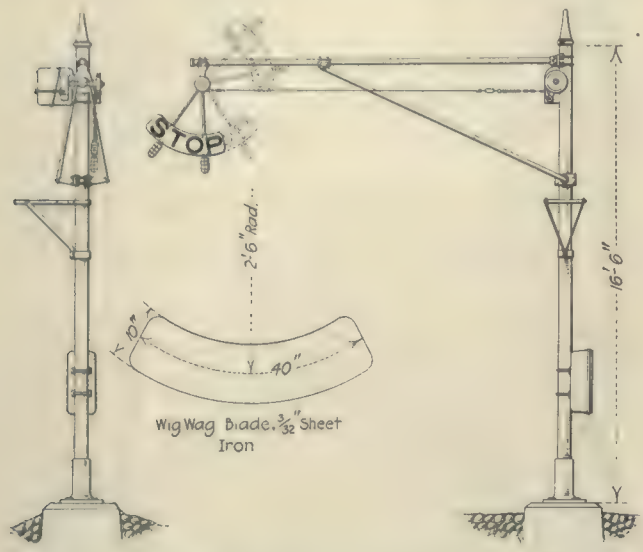
SIOUX CITY HYDRAULIC BROACHING MACHINE

As shown in the accompanying illustration, the broaching machine comprises a substantially-built frame with a heavy circular bedplate upon which the bearings to be broached or pressed into housings are placed. A hollow plunger fitted to an old air-brake cylinder connected to the shop compressed-air system and the city water supply, furnishes the necessary pressure. City water pressure of 90 lb. per square inch may be obtained, but when more is necessary a small belt-driven hydraulic pump mounted on the upper part of the frame and connected to the cylinder is brought into operation. With this, pressures up to 30 tons or 40 tons are obtainable if required. A gage connected to the cylinder and mounted in plain view indicates what pressure is being used. After broaching or pressing has been accomplished, the plunger is raised to the normal position by cutting off the water supply and injecting air pressure beneath the piston head through a standard motorman's valve. This is a home-made machine which was not very expensive to build and has paid for itself many times over in improved bearings.

A Home-Made Wigwag Signal

BY F. T. VANATTA, CHIEF ELECTRICIAN NORTHWESTERN PACIFIC RAILROAD, SAUSALITO, CAL.

Last year the writer designed a wigwag signal of the type illustrated, of which five have already been installed at crossings on the Northwestern Pacific Railroad. Unlike other wigwag signals, which wigwag only in case of danger, this one has three positions: First, normal clear; second, wigwag in top horizontal position for danger with the apparatus in perfect condition, and third, wigwag dropped permanently to danger if there is any defect in the control apparatus.



ASSEMBLY AND DETAIL OF BLADE OF WIGWAG SIGNAL FOR HIGHWAY CROSSING

There is, therefore, no danger of false clear indications. The sheet-iron stop shield is about 40 in. long and 10 in. wide, and carries for night use two 40-watt lamps in marine fixtures with red outer globes. These lamps burn only during the wigwag period. The mechanism which operates the banner and lights is of the automatic type furnished by the General Railway Signal Company, a short arm with an eccentric thereon having

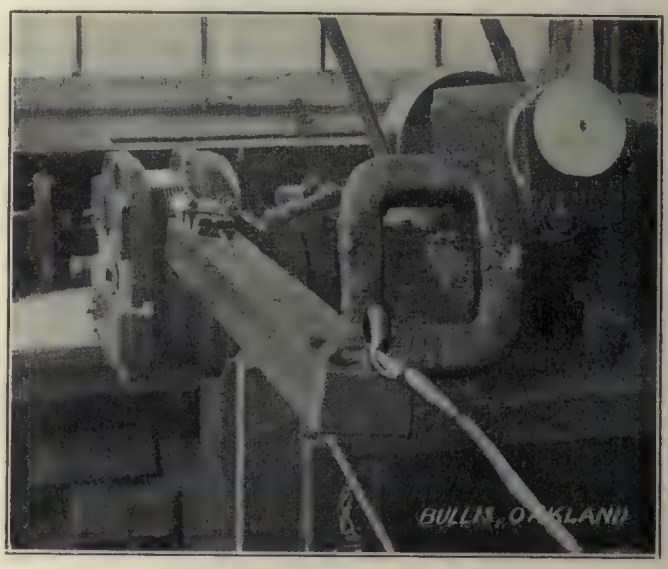
AUTOMATIC WIGWAG CROSSING INSTALLED AT SAN ANSELMO, CAL.

been added to secure the wigwag movement. This mechanism is operated from the regular track circuits such as are used for ordinary crossing-bell operation, or it may be operated by hand. For example, at Petaluma station, which is located between two signals, a train going one way sets the first signal automatically but must wait for the station master to set the signal at the outgoing end. At night, however, when there is no station agent on duty these signals are automatic throughout in this operation.

Rejuvenating Overloaded Motors

BY W. P. JACKSON, MASTER MECHANIC SAN FRANCISCO-OAKLAND TERMINAL RAILWAYS

The San Francisco-Oakland Terminal Railways have 380 GE-70 motors in city service on two and four-motor equipments averaging about eight stops per mile on a 10-m.p.h. schedule. These motors are rated at 40 hp on 500 volts, and their mechanical construction and electrical characteristics compare very favorably with some of the more modern type. Up to about four years ago these motors were carrying about 13,000 lb. light with 22:64 gear ratio on 30-in. wheels. Owing to the addition of straight air-brake equipments and fenders, and to the lengthening and rebuilding of a number of cars, the average load on these motors was increased until operating temperatures of 80 to 90 deg. Cent. were not uncommon. Maintenance of armatures and field coils became a serious problem, especially on sixty-eight



WIRE IN PROCESS OF APPLICATION ON FIELD COILS; ALSO ONE COMPLETED FIELD COIL WITH HEATPROOF INSULATION

two-motor equipments on which the weight of body and equipment, exclusive of passengers, had been increased to 34,200 lb.

Thus it became a daily occurrence to have solder thrown off from commutators or bands. In fact, conditions became so acute that a radical change of some sort was imperative. Apparently three courses were open: To purchase new motors of larger capacity; to modify operating schedules to conform more nearly to the capacity of the motors in use; or to rehabilitate the motors themselves in such a manner that existing schedules could be met at a lower temperature in field and armature windings, and otherwise to make the motor as near heatproof as possible. The last course was taken, and for two years the work was carried on during the course of regular maintenance and as a charge against the same.

The bottom handhole plate on the commutator end and the top handhole plate on the pinion end were perforated as closely as possible with ½-in. holes. In this way free circulation of air was obtained through the interior of the motor case whether the car was running or standing still. The handhole plate on the pinion end

was provided with a sheet-metal guard over the perforations. While these motors are allowed to run open the year round, we have never had any cases of motor trouble due to the entry of water, street dirt or other foreign substances.

When armatures are rewound, the end windings are left as open as possible. The bands are soldered with pure tin, and the hoods are left off of both ends to allow free circulation of air around the coils and leads to the commutator. Delta tape is used as insulation under the bands on the core and end windings, while the face of the leads adjacent to the brushes receives several coats of a mixture of shellac and metallic brown. This mixture has given excellent results as a resistant to flashing and does not carbonize under high temperature. The same mixture is used as a coating on the bead ring and string band back of the commutator.

After the armatures have been in service from 60,000 to 75,000 miles they are removed during the course of motor overhauling, blown out thoroughly and otherwise cleaned up and placed in an oven for twelve hours at 100 deg. Cent. If the coils are loose under the bands, the armature is rebanded while hot and then dipped in black elastic baking varnish, allowing sufficient time for the varnish to penetrate thoroughly all parts of the winding. The armature is then drained to receive a further baking of twenty-four hours at 100 deg. Cent.

Field coils are wound with No. 3 Deltabeston wire heated in an oven at 100 deg. Cent. and dipped while hot in black elastic baking varnish. After draining and cooling a heatproof plastic composition is smoothed over the outside turns and the coil is served with a half lap layer of pure asbestos-woven tape, 20 mils thick. This tape has good mechanical strength and is drawn very tightly around the windings. The coil is then heated a second time to 100 deg. Cent. and dipped, following which it is served with one layer of Delta tape 20 mils thick and 1 in. wide.

Three screw terminals with copper conducting strips cast in are then fastened to the coil with asbestos twine, the terminals being insulated from the coils with two thicknesses of 20 mils Delta sheeting. The coil then receives a final wrapping of asbestos-woven tape, is heated for the third time, and after dipping is returned to the oven for a baking of forty-eight hours at 100 deg. Cent. All field coils receive the usual transformer tests for "shorts."

Not one of the coils made in the manner described has ever been removed from the motors, and they are standing up under conditions where an ordinary impregnated coil will not last sixty days. The cost of manufacture is $20 each.

The field connections in the motor case are made with No. 4 flexible strand, soldered into terminals made of scrap No. 0000, solid feed wire turned to ¼ in. diameter for the field terminal, with a hole drilled in the full-sized end for the lead wire.

As a further and not inconsiderable help to these motors we are gradually changing the gear ratio in the heavier cars from 22 : 64 to 19 : 67. The installation of armorized material has a tendency to hold up the maintenance figure on these motors to a certain extent.

During the year 1912 the monthly troubles on these rejuvenated motors averaged as follows:

Armatures, grounded	21
Armatures, open circuit	15
Fields, grounded	10
Fields, open circuit	5
Fields, weak	25
Maintenance per 1000 motor-miles	$1.30

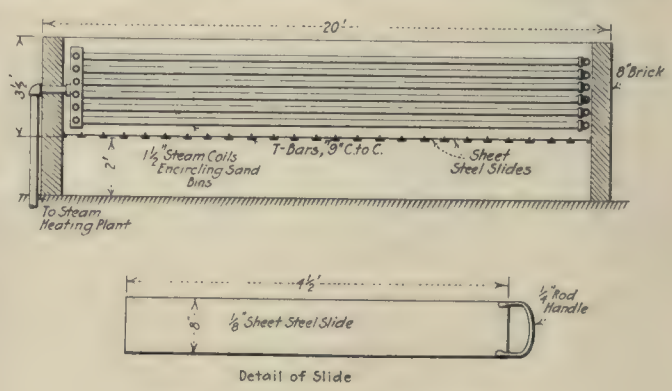
During the past fiscal year the monthly average of troubles has been:

Armatures, grounded	5
Armatures, open circuit	8
Field troubles (all kinds)	10
Maintenance per 1000 motor-miles	$0.96

The maintenance given includes gears, pinions, gear cases, armatures and axle bearings, suspension, and all parts of the motor proper. These 380 motors make an average of 1,476,000 motor-miles per month.

Drying Sand in 7-Yd. Batches

Small-capacity sand dryers require more or less constant attention and, while they are entirely satisfactory at carhouses where labor is always available, where this condition does not prevail a man must be detailed to attend to the work. The Sioux City (Iowa) Service Company eliminated this objection in Carhouse C, where the running repair force was only sufficient to take care of the equipment by providing a sand dryer of large capacity when the building was constructed. Aside from its capacity this dryer is unique in several particulars. It is installed in a room set aside for the storage of wet and dry sand as well as the drying plant. This room is oblong in plan and one wall of the sand dryer serves as one side of the wet sand bin, while the other side of the dryer is open so that the dry sand may be cast into the storage space at the opposite end of the room. As indicated in the accompanying illus-



SIOUX CITY 7-YD. SAND DRYER

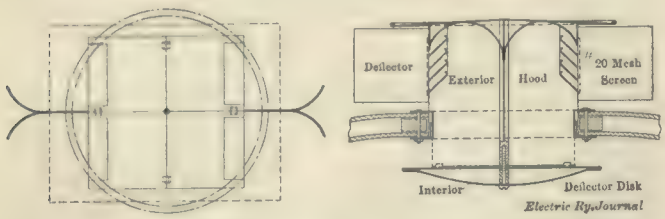
tration, the bin is formed of four 8-in. brick walls with concrete coping, and it is 20 ft. long by 4½ ft. wide over all, and 3½ ft. deep. The floor of the bin is 2 ft. above the building floor and is formed of T-bars, the legs of which support sheet-steel slides. The top of the dryer bin walls is only 5½ ft. above the floor level, hence the wet sand may be readily cast into the dryer. One and one-half-inch steam pipe coils encircle the interior of the dryer and are connected to the building heating plant. Comparatively little sand is used during the summer months, hence steam heat is available when most dry sand is needed.

After the dryer bin has been filled with wet sand, holes are poked into the sand at frequent intervals with a broom handle. These hasten the drying process by permitting the escape of moisture. When the sand is dry the sheet-steel slides are withdrawn and the dry sand falls to the floor beneath the bin. From this point the sand is screened and cast into the dry-sand storage space. From the foregoing it will be seen that the work of casting sand into the bin is one process, and between that and the screening of the dry sand quite an interval may elapse, hence the dryer needs attention only when a 7-yd. batch is exhausted. This type of dryer has been very effective and the cost is relatively low when the dryer is installed at the time the building is constructed. Its principal advantage, however, is that it requires little attention and drying sand in it makes a fine rainy-day job for an outside man.

Long Island Railroad Installs Double Ventilators

The accompanying cuts show in detail the system of ventilation used on the twenty new steel trail cars recently placed in operation on the Long Island Railroad, which were described in the ELECTRIC RAILWAY JOURNAL of July 24.

The ventilators, provided for these cars by the Automatic Ventilator Company, New York, N. Y., are of a new design, but embody the well-known "intake and exhaust" principle of this system. This device, known as type "E-B," is installed on the center line of an almost flat roof and consists of an exterior hood,



LONG ISLAND VENTILATORS—BOTTOM VIEW AND CROSS-SECTION

divided into four separate compartments, two exterior deflectors and an interior disk. When the car is in motion air is arrested by the exterior deflectors and directed into the two forward compartments (one on either side) of the hood and thence down to the interior disk, and is deflected outward and upward across the ceiling of the car, where it is sufficiently diffused to prevent a draught on the passengers. At the rear of the exterior deflectors is set up a partial vacuum caused by the rapid motion of the car, which induces a strong "exhaust" at the two rear ports of the hood and at the rear of the interior disk. Each ventilator provides two intakes and two exhausts and is therefore equal to two separate ventilators.

Cleaning Air for Ventilating Generators and Transformers

In the August issue of the *General Electric Review*, William Baum, electrical engineer General Electric Company, directs attention to the importance of cleansing and cooling the air used for the ventilation of turbo-generators and air-blast transformers. This is desirable because the accumulation of dirt means rapid deterioration and frequent cleaning. He considers the requirements of air filters to be as follows: Complete removal of suspended matter, minimum loss in pressure due to air passing through the clean and soiled filtering medium, minimum dimensions, simple construction with means for convenient removal and cleaning of the filtering medium, durable filtering medium which does not require too frequent removal and minimum fire risk. He discusses the available filters with respect to these requirements, describing typical filters of the wet-surface and dry-surface types. Air washers are also discussed with the statement that their prime object is to clean the air, the humidifying function being secondary. The cooling effect of the water is not appreciable. No insulation troubles have been experienced due to the effect of the saturated air upon generator windings. Some fifty-eight air washers have been installed in the United States for the ventilation of generators of an average size suitable for a 10,000-kw. generator. It appears that air washers are used for larger generators, dry-surface filters for small ones, and wet-surface filters for medium sizes. Air washers consist of the following essential parts: spray chambers, spray nozzles and piping, eliminator or baffle plates, strainer, settling tank and water circulating system with pump. The difference in the various makes is principally in the design and arrangement of the nozzle. Mr. Baum describes a number of typical air washers and gives tables and curves of space required and of unit costs. The space requirements are as follows: Air washers, 0.17 cu. ft. per cubic foot per minute; dry-surface filters, 0.10 cu. ft. per cubic foot per minute, and wet-surface filters, 0.09 cu. ft. per cubic foot per minute. In sizes from 30,000 to 60,000 cu. ft. per minute capacity air washers and wet-surface filters average in first cost about 3 cents per cubic foot per minute, washers being slightly cheaper as the size increases. Dry-surface filters cost about 1½ cents per cubic foot per minute. In all types the unit cost increases rapidly with decrease in size.

The general conclusions are as follows: For generators up to about 5000-kw., dry-surface filters may be recommended on account of low first cost, and if the air is not too dirty, their application is of advantage in dry, cold climates. They require careful attention and handling. Wet-surface filters, which have been found successful in England, have not yet been introduced in this country. Their field of application is for generators above 5000-kw. in size. The tendency toward the installation of large turbo-generator units will undoubtedly increase the application of air washers or humidifiers in preference to other types of air-cleaning apparatus. In dry, hot localities the cooling effect of air washers is appreciable. Special precautions are necessary to prevent freezing in winter.

Easily Applied Hose Coupling

An air, steam or water hose coupling, so designed as not to decrease the area of the hose connection, has recently been placed on the market by the National Hose Coupling Company, Chicago. It is furnished with a malleable-iron hose socket which fits over the hose and which is sufficiently corrugated on the inside to provide a positive grip when the hose is expanded inside it. A steel taper expander screws into the socket containing

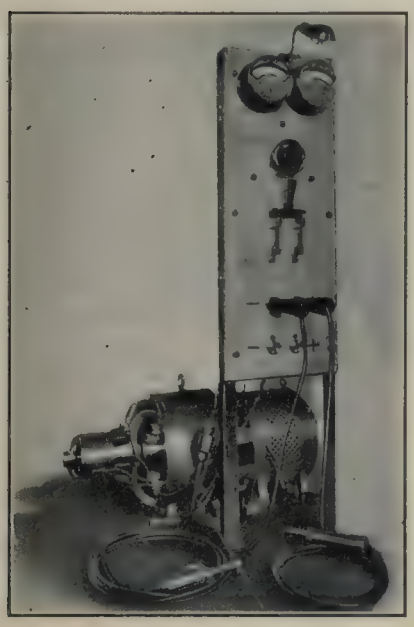
HOSE COUPLING WITH SECTION CUT AWAY TO SHOW CONSTRUCTION

the hose and the latter is thus forced outward and into position. The area of the opening in the expander is the same as that of the hose, so that no obstruction to the flow is introduced. Application of the hose connection requires only a few turns with an ordinary hand wrench, and this makes it especially advantageous for use in connection with air-brake hose. The coupling is being manufactured in all standard sizes.

Willy Lamot, Antwerp, Belgium, whose present address is Shardhighs, Halstead, England, reports the creation of an organization to introduce into Belgium as soon as the war is over all American products and manufactures and to employ as agents, representatives, etc., a number of Belgian manufacturers and business men who are prepared to give the necessary guarantees as agents and dealers.

Compact Arc-Welding Outfit

An arc-welding outfit of the motor-generator type, which possesses to an unusual degree the qualities of compactness and lightness, has recently been brought out by the Lincoln Electric Company, Cleveland, Ohio. It has been designed with the view of establishing distinctive features in economy of power consumption, simplicity of operation and reliability of service.



COMPLETET ARC WELDING OUTFIT

These features are obtained largely by the fact that the motor-generator is so designed as to generate at all times exactly the voltage required by the arc and in addition, give a current which is practically constant. In consequence, there is no need for resistance in the circuit to cut down the voltage, and the size and weight of the machine is reduced to the minimum necessary for the work in hand. Regulation is effected by special windings in the generator and by a simplified method of control which is easily grasped in a very short time by any reasonably intelligent operator. This is considered to be of utmost importance as most autogenous welding is done by men who are neither electricians nor mechanics, and since labor is a great factor in the cost of welding the machine ought to be so simple that it is not necessary to have a highly skilled man to do the work.

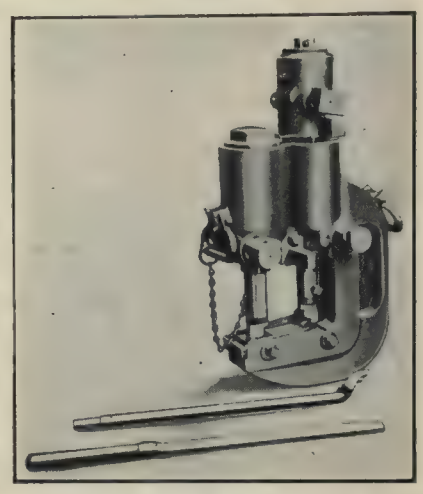
The Lincoln arc welder has been designed to stand long, heavy duty and to carry overloads without damage to the machine, as emergency service is frequently demanded in arc-welding plants. Every motor-generator is operated in the factory before shipment for five hours under a continuous make-and-break test in which the make and break at the rated output of 150 amp. occurs at least fifteen times per minute, and under this test the temperature rise is guaranteed not to exceed 40 deg. C. in the windings and 55 deg. C. at the commutator. Naturally, this conservative method of rating and the severe service test insures a liberal margin of safety in operation, both under normal and abnormal operating conditions.

Owing to the fact that no power is wasted in resistance banks the demand for current is small, and in ordinary service the Lincoln welder can be operated on any power line large enough to carry a 10-hp. motor. This permits the installation of the outfit at almost any point in a shop where there is a power line, and if desired the machine may be made portable and connected wherever the exigencies of the work demand it. In operation the machine is thoroughly flexible, and any number of them may be operated individually or in parallel. In fact, an operator can, without the services of an electrician, connect three 150-amp. plants in parallel to get 450 amp. for heavy carbon electrode work, and can then individualize the plants within a few minutes' time.

Aside from providing the feature of portability the small size of each plant limits the expenditure of money invested in welding equipment to a proper basis in proportion to the amount of work that is actually done. Where there is sufficient work to require more than one operator a separate unit is installed. In large railway shops where the time that is allowed to do work is limited and an accident to the welding plant would hold up the rest of the organization, the installation of individual welders serves as a form of insurance against the loss that would be inevitable in case a total shut-down occurred.

Hydraulic Punch for Track Spike Slots

A new hydraulic punch for cutting out at one setting two slots or notches for spikes in flanges of railroad or conductor rails has been brought out by the Watson-Stillman Company, Aldene, N. J. The advantages of this tool are that two holes can be punched at one operation on opposite sides of the rail in exact alignment, thus saving much of the time usually consumed in laying out centers and changing the punch from one side of the rail to the other. The machine makes an efficient tool for use by unskilled labor.



VIEW OF TRACK SPIKE SLOT PUNCH

From the accompanying illustration it will be seen that one punch is attached to a chain. This punch is removed and the tool is placed against the rail. The loose punch is then inserted in place and the punches are then run down to the rail by pinions, meshing into racks on the rams. A few strokes of the pump lever completes the operation, which takes less than two minutes and but little effort. The punches are pulled back by a rack and pinion movement.

The punch is built compactly and is so designed that the greatest strength is obtained with the least weight. Consequently, it may be easily and quickly handled when time is a factor. The working parts are readily accessible for cleaning and the punches and dies are removable, thus providing for sharpening and renewal.

Silica-Graphite Paint for Steam Boilers

A practice that is gaining recognition in power plants is the use of graphite paint for the inner surface of steam boiler drums. This is said to afford protection against pitting. For a number of years the manufacturers of the paint have coated the steam drums of five B. & W. boilers developing 1800 hp., and as a result the drums are in almost perfect condition. In another plant equipped with B. & W. boilers developing 8400 hp. the interiors of the drums were scalded, painted both above and below the water line and allowed to dry for forty-eight hours. This treatment was repeated every ten months, and not only was pitting stopped, but where it had previously taken six men seven days to clean the drums of one boiler, two men now clean them in a day. This latter experience is quoted from a letter of the chief engineer of the New York Life Insurance Company, in a recent issue of *Graphite*.

Electric Railway Legal Decisions

CHARTERS, ORDINANCES, FRANCHISES

Idaho.—Regulation of Utilities—Duplication of Electrical Plants.

All property devoted to public use is held subject to the power of the State to regulate or control its use in order to secure the general safety, health and public welfare of the people, and when a corporation is clothed with rights, powers and franchises to serve the public, it becomes in law subject to governmental regulation and control.

Under the State's police power the Legislature has authority to authorize the utilities commission to determine whether a duplication of an electrical plant is required in a town or city for the convenience and necessity of the inhabitants. (Idaho Power & Light Co. v. Bloomquist et al., State Public Utilities, 141 Pacific Rep., 1084.)

Kentucky.—Definition of Interstate Commerce—Reasonable and Unreasonable Municipal Regulation.

The traffic carried on by a Kentucky street railway corporation in connection with an Ohio corporation operating on the Ohio side of the Ohio River, in transporting passengers upon continuous and connecting tracks and across an interstate bridge between points in Covington, Ky., and Cincinnati, Ohio, by means of continuous trips and a single fare, and under practically the same management, is interstate commerce.

The absence of federal regulation does not justify the city of Covington, Ky., in regulating the interstate business of a street railway company principally engaged in transporting passengers from that city to Cincinnati, Ohio, by restricting the number of passengers which the company may admit to its cars to not more than one-third in excess of the seating capacity, except on certain holidays, and by requiring the company to operate sufficient cars reasonably to accommodate the public within the limits of such restriction, where compliance with such regulations will require about one-half more than the present number of cars operated by the company and more cars than can be operated in Cincinnati within the present franchise rights and privileges held by the company or controlled by it in that city.

Municipal regulation of a street railway company, principally engaged in interstate commerce, with reference to passengers riding on car platforms unless the same are provided with suitable rails or barriers, and with reference to the cleanliness, ventilation and fumigation of the cars, does not infringe upon the federal authority over such commerce—at least, until such federal authority is exerted.

A municipal ordinance providing that the temperature of the cars of a street railway company which is principally engaged in interstate commerce shall never be permitted to be below 50 deg. Fahr. must be deemed to be invalid as unreasonable, where the undisputed testimony shows that it is impossible in the operation of the cars to keep them uniformly up to this temperature, owing to the opening and closing of doors, and other interferences that make it impracticable. (South Covington & Cincinnati St. Railway Co. v. City of Covington, 35 Supreme Court Rep., 158.)

Massachusetts.—Crossings of Transmission Lines Over Highways—Abolition of Grade Crossings.

Where a railroad right-of-way crosses a public highway the land is subject to both easements, each to be exercised reasonably with reference to the other, and under such circumstances electric wires may be carried over the tracks in a proper way without liability to the railroad company.

Where grade crossings are abolished in accordance with Stat. 1906, Chap. 463, Part 1, Secs. 29-45, the two conflicting easements of the railroad company and of the public in the street are separated, and an electric company authorized to string its poles and wires in the street cannot place its poles over railroad tracks which have been elevated above the street. (N. Y. C. & H. R. R. v. Central Massachusetts Electric Co., 106 Northeastern Rep., 566.)

Minnesota.—Ordinance Requiring Additional Line.

Under the reserved authority of the city to order the construction of new lines of street railway, the city may direct whether a new line shall be a single or double track line, and defendant possesses under its franchise no vested right or option to determine the character of the line in this respect. (State ex rel. City of St. Paul v. St. Paul City Ry. Co., 149 Northwestern Rep., 195.)

Missouri.—Eminent Domain by Electric Railway—Value of Property for Station Purposes.

An electric railway incorporated under the steam railroad act (Rev. Stat. 1899, Secs. 1034-1174) is entitled to condemn land for railroad purposes, and, if it is an interurban railroad, it has equal right conferred by Laws 1907, page 174.

Where condemnation of land for railroad freight and passenger depot purposes was part of a general scheme previously inaugurated for the construction and operation of the railroad in accordance with a lay-out and plat adopted prior to the construction of railroad buildings on adjoining property, the owners of the property sought to be condemned were not entitled to have any increase in value of their property by reason of the improvement of the adjoining property considered in determining the value of their property for railroad purposes. (St. Louis Electric Terminal Ry. Co. v. MacAdaras et al., 166 Southwestern Rep., 307.)

Nebraska.—Permission Required to Discontinue Service.

When a company has obtained a franchise from the city to construct and operate its railways on certain streets of the city and has constructed its tracks and is operating its cars thereon pursuant to such franchise right, it will be enjoined from removing such lines or withholding its cars from such service without first obtaining authority from the State Railway Commission so to do. (H. Herpolsheimer Co. et al. (Wolfe et al., Interveners) v. Lincoln Traction Co., 147 Northwestern Rep., 206.)

New York. — Certiorari to Review Assessments—Testing Excessiveness of Assessment.

On certiorari to review the assessment of a street railway company's special franchise for taxation, where the State board of tax commissioners in its return stated that it availed itself of all tests of value within its reach and all information bearing upon such value and adopted no certain or fixed rule or method; that it would be impossible to state more definitely the mental operation which prompted it in arriving at the valuation fixed or to state which of the different elements, theories or methods considered most influenced the minds of the individual members, or to what extent each test was used, but that the valuation was finally fixed and agreed upon as the combined judgment of the board, irrespective of the individual methods of arriving at it, it was not error to permit the railroad company to show that the assessment was excessive under the net earnings rule, on the theory that as the board was not bound to adopt that rule, error was not proved by showing excessiveness under that rule, since the assessments were not conclusive but were subject to review, and the courts cannot review the undisclosed and concededly indescribable methods followed by the State board. (People ex rel. Third Ave. Ry. Co. v. State Board of Tax Commissioners (City of New York, Intervener); People ex rel. Wallace et al. v. Same; People ex rel. Kingsbridge Ry. Co. v. Same, 106 Northeastern Rep., 325.)

New York.—Rights of Transfer Passenger to Travel by Most Direct Route.

A passenger on a street railway car is entitled to be carried to his destination by the most direct route, Hence, where he was accepted on a short service car, which necessitated a transfer to a through car, the company cannot require him to transfer to a parallel line further over, except for some most cogent reason, and a mere statement that such requirement was to avoid congestion and for the convenience of passengers is no reason. (Goodman v. New York Rys. Co., 150 New York Sup., 702.)

New York.—Transfers Required Between Two Allied Companies.

Public Service Commission Law (Consol. Laws, Chap. 48) Sec. 49, Sub. 7, provides that every street service railroad corporation entering into a contract with another such corporation, as provided in Sec. 78 of the Railroad Law (Laws 1890, Chap. 565, as amended by Laws 1905, Chap. 695), shall carry between any two points on the railroads any passenger desiring to make a continuous trip for a single fare, and such corporation shall, without extra charge, give to each passenger paying a single fare a transfer entitling

the passenger to one continuous trip to any point of any railroad embraced in such contract, and for every refusal to comply with the subdivision the corporation shall forfeit $50 to the aggrieved party. Railroad Law, Sec. 78, provides that any railroad corporation may contract with another for the use of their respective routes and that such contracts shall be executed by the contracting corporations under their seals, and, if it be a lease of any such road and for a longer period than one year, it shall not be binding unless approved by the votes of stockholders owning at least two-thirds of the stock of the corporation. Held, that where two street railroad corporations, though separate corporate entities, had the same office, officers and directors, and used and equipped cars interchangeably, paid operating expenses from the gross receipts of both, and were for all practical purposes one line, a passenger on one road could require a transfer to the other without extra charge, and could recover the statutory penalties for refusal to issue such transfer, notwithstanding there was no written contract between the corporations for the lease of one of the lines and though the arrangement between the companies was purely informal. (Catalano v. International Ry. Co., 145 New York Sup., 1005.)

New York.—Temporary Injunction Restraining Construction of Elevated Railway.

The reconstruction of an elevated railway, so as to destroy to a greater extent than before an abutting owner's easements of light, air and access, would be enjoined on a preliminary motion, where there was no material disputed question of fact, instead of awaiting the trial of the action, pending which the structure would probably be completed. (Rothschild v. Interborough Rapid Transit Co. et al, 147 New York Sup., 1040.)

LIABILITY FOR NEGLIGENCE

Connecticut.—Injuries to Alighting Passenger from Car Overhang.

Plaintiff, having assumed a position, when she alighted from a car, which was apparently free from danger and without knowledge of the actual danger from the overhang of the car as it rounded the curve at such point, was not guilty of contributory negligence as a matter of law. (White v. Connecticut Co., 92 Atlantic Rep., 411.)

Illinois.—Liability to Employee Riding on Pass.

A provision on the back of a free transportation ticket furnished to a street car employee releasing the company from all liability for personal injuries, was void, where the relation of carrier and passenger existed between the company and the employee. Klinck v. Chicago City Ry. Co., 104 Northeastern Rep., 669.)

Indiana.—Master and Servant; Injury to Motorman—Construction Work.

In an action by a servant for personal injuries caused by his having an unsafe place to work, the burden is on the servant to show that the master had knowledge, actual or constructive, of the dangerous condition long enough before the accident to have repaired it or to have given the servant timely warning of its condition.

A motorman operating a car drawing a plow on an uncompleted track on which no passenger or freight trains had been run was engaged in construction and assumed all risks incident to the service. (Egan v. Louisville & S. I. Traction Co., 103 Northeastern Rep., 1100.)

Indiana.—Liability to Employee Riding on a Pass.

Where a street railway regularly furnished its servants with passes to and from their work, a stipulation in such passes exempting the company from liability for injuries caused by its negligence is uninforceable, being contrary to public policy, the issuance of the passes being one of the considerations for the employment. (Indianapolis Traction & Terminal Co. v. Isgrig, 104 Northeastern Rep., 60.)

Kentucky.—Degree of Care Required to Prevent Injury to Property.

A street railway is bound to use extraordinary care only for the protection of its passengers, and, where its car left the tracks and injured adjacent property, it was not negligent if it used ordinary care to discover obstructions which caused the accident. (Kentucky Traction & Terminal Co. v. Bain (two cases), 170 Southwestern Rep., 499.)

Massachusetts.—Negligence May Be Imputed to Child Nine Years Old.

Plaintiff, a boy of nine years, was injured while crossing behind a street car by being struck by another car on the opposite track. He was familiar with the locality, and although alone there was nothing to distract him from caring for himself. There was no evidence that he listened for an approaching car, and though he testified that he looked twice in the direction from which the car approached and did not see it, there was no evidence to show that he could not see the car which struck him from the place where he looked. Held, that plaintiff was guilty of contributory negligence as a matter of law. (McManus v. Boston Elevated Ry., 103 Northeastern Rep., 284.)

Massachusetts.—Duty to Inspect Car Equipment.

The plaintiff was injured, while a passenger, by the breaking of a bolt in the back of a seat against which she was leaning. The bolt had a break which was invisible when it was in place, but it could have readily been removed for inspection. The cars had been in use for five years, and there was no evidence that the bolt had been inspected during that time, although it was an important bolt and in a position which subjected it to strains. Held, that the question of defendant's negligence was one for the jury, and that it was error to direct a verdict in its favor. (Murphy v. Milford, A. & W. St. Ry. Co., (two cases), 210 Federal Rep., 138.)

Massachusetts.—Injury to Passenger from Person Not in Employ of Company.

Where a passenger, who entered a closed subway car through its front vestibule, put her hand back of her on the jamb of the door to save herself from being thrown forward when the car started and someone not in the service of the carrier shut the door on her thumb, the carrier was not liable, where it was not the custom or duty of its servants to close the door. Tracy v. Boston Elevated Ry. Co., 105 Northeastern Rep., 351.)

Massachusetts.—Car Passing Stationary Car.

The operation of a car on one track on approaching a stationary car on another, in violation of the rule requiring the slowing down of a car and the sounding of the gong when passing a stationary car, is negligence. (Emery v. Boston Elevated Ry. Co., 105 Northeastern Rep., 889.)

Missouri. — Responsibility for Panic Following Controller Explosion.

The explosion of a car controller is prima facie evidence of negligence, and imposes on the company the burden of showing that the explosion was due to unavoidable accident. The death of a passenger pushed from the rear platform by other passengers in their haste to leave the car after such an explosion was the natural consequence of it, the test of liability being whether there was an appearance of imminent danger that reasonably should have been anticipated as too terrifying for passengers to face without alarm. (Agnew v. Metropolitan St. Ry. Co., 165 Southwestern Rep., 1110.)

Missouri.—Boarding Moving Elevated Car.

One who attempted at an elevated station to board a moving car, the gates of which were being closed, is guilty of contributory negligence as a matter of law, where the step of the car was within a few feet of the end of the platform, at which point the company maintained a sign warning the public against boarding moving cars. (Speaks v. Metropolitan St. Ry. Co., 166 Southwestern Rep., 864.)

Nebraska.—Injury to Passenger Riding on Steps.

A person standing on the steps of a moving street car, being unable to secure a seat or standing room within, is presumed to be there with the consent of the servants in charge of the train. (Kadner v. Omaha & C. B. St. Ry. Co., 151 Northwestern Rep., 169.)

New Jersey. — Injury to Pedestrian at Corner from Car Overhang.

In view of the well-known fact that in rounding a curve the rear end of a street car will swing beyond the track and overlap the street to a greater extent than the front, the motorman is justified in presuming that an adult person standing in the street near the track, who is apparently able to see, hear and move, having notice of the approach of the car and of the existence of the curve in the track, will draw back far enough from it to avoid being struck by the rear of

the car as it swings around the curve in the usual and expected manner, and under such circumstances it is not negligent operation on the part of the motorman to continue the progress of the car without warning such person of the possible danger of collision with the rear of the car, because of the swing, if he remains in the same position. (Miller et al. v. Public Service Corporation of New Jersey, 92 Atlantic Rep., 343.)

New York.—Injury to Boy Who Climbed on Bumper.

Plaintiff, with five other boys, climbed on the rear bumper of defendant's trolley car and claimed that he intended to pay his fare. After the car had gone a few hundred feet the conductor came toward the boys, called to them to get off and made threatening gestures but was too far away to cause serious apprehension. Plaintiff and his companions sprang from the car, landing on their feet, when plaintiff ran onto the opposite track without looking for a car and was struck by a car going in the opposite direction. Held, that the facts were insufficient to raise an inference of actionable negligence on the part of the conductor in forcing plaintiff from the car by threats of personal violence. (Luter v. Union Ry. Co. of New York, 145 New York Sup., 893.)

New York.—Application of Sand and Brakes on Rainy Day.

An error of judgment by a motorman as to the time when he must apply sand and brakes on a rainy day, to avoid collision, is not negligence as a matter of law. (Koster v. Coney Island & B. R. Co., 151 New York Sup., 56.)

New York.—Third-Rail a Nuisance on Highway.

Where an electric third-rail used by a railroad to furnish motive power projected into a highway crossing unnecessarily, it was a nuisance, and the railroad was liable for an injury occasioned thereby. (Bloss v. Oneida Ry. Co., 147 New York Sup., 728.)

Ohio.—Traffic Agreements—Personal Injuries.

When one company makes an agreement with another company, under authority granted by Sec. 3443—17, Rev. Stat., for the joint use of its tracks, it is liable for injuries caused by the actionable negligence of its licensee thereon. The statute does not provide exemption from such liability, and as against the public it will not be implied. (Quigley v. Toledo Rys. & Light Co., 105 Northeastern Rep., 185.)

Oregon.—Injuries to Persons on Track.

Where there is evidence that a railroad acquiesced in the use of a bridge as a footway by the public, an instruction requiring of the railroad only the lowest degree of care for the protection of a person on the bridge was error. (Doyle v. Portland Ry., Lt. & Pr. Co., 143 Pacific Rep., 624.)

Oregon.—Measure of Damages for Death Under Employers' Liability Act.

The measure of recovery for death under Employers' Liability Act (Laws 1911, page 17) Sec. 4, giving a right of action for death caused by a violation of the act, is the pecuniary loss sustained, and the jury may not consider as element of damages deprivation of comfort, society, support and protection. (Fisher v. Portland Ry., Light & Power Co. et al., 145 Pacific Rep., 277.)

Oregon.—Violation of Fender Ordinance Negligence Per Se.

The operation of street cars not equipped with a fender as required by a valid city ordinance, from which an injury to a child upon the track resulted, was negligence per se. (Rudolph v. Portland Ry., Light & Power Co., 144 Pacific Rep., 93.)

Pennsylvania.—Master and Servant—Breakage of Coupling.

Where, in a street railway brakeman's action for injuries from falling between two freight cars being shifted by defendant's motor, it appeared that the cause of the accident was a jar due to the sudden application of power by the motorman causing the coupling to part, and there was no evidence that the coupling was out of repair or defective or different from those in ordinary use, a nonsuit was properly entered on the ground that the proximate cause of the accident was the act of plaintiff's fellow servant in the management of the motor. (Cover v. Conestoga Traction Co., 92 Atlantic Rep., 495.)

Pennsylvania.—Injury to Passenger on Running Board.

Since, in an action for the death of a passenger from collision with the shafts of a passing vehicle while he was standing on the running board of a crowded summer trolley car, the accident being due to the sudden and unexpected shying of the horse, there was no presumption of negligence on the part of the defendant railway company, the burden was on plaintiff to prove actual negligence. (Kurts v. Philadelphia Rapid Transit Co., 90 Atlantic Rep., 525.)

South Carolina.—Power of Headlight Proper Question for Jury.

Evidence that a proper street car headlight would throw light on the track 200 yards ahead of the car, and that the headlight on the car by which decedent was killed only threw a light from 35 to 50 ft., made it a question for the jury whether the street car company was guilty of wanton negligence in not having a proper headlight. (Kirkland v. Augusta-Aiken Ry. & El. Corp., 81 Southeastern Rep., 306.)

Texas.—Injuries to Persons on Tracks.

Where an intoxicated man negligently stepped in front of an approaching street car, his would-be rescuer stands in the same position as the intoxicated man, and the negligence of the latter is attributed to the rescuer, so that no recovery can be had against the street car company, though its servants were also guilty of negligence. (Scates v. Rapid Transit Ry. Co., 171 Southwestern Rep., 503.)

Utah.—Conductor's Assent to Passenger Alighting from Moving car.

Where a passenger on a street car, which he thought would follow one route, upon discovering that it had turned off, requested a transfer from the conductor so that he could catch a car following, and the conductor said that he could get off as the car was moving slowly, the passenger's attempt to alight in accordance with the suggestion of the conductor is not contributory negligence as a matter of law (quoting Paul v. Railroad, 30 Utah, 30, 83 Pac. 564). (Gaines v. Ogden Rapid Transit Co., 141 Pacific Rep., 110.)

Washington.—Company Not Liable for Injury to Employee Riding on Pass.

Even though an employee of a common carrier was promised free transportation as part of her compensation, yet where, on applying therefor, she was required to and did sign an application stating that the pass issued was a mere gratuity and based on no consideration, she thereby waived, as she had a right to do, the benefit of her prior contract for free carriage, and hence would be a mere gratuitous passenger for whose injuries caused by negligence the carrier was not liable. (Hageman v. Puget Sound Electric Ry., 141 Pacific Rep., 1028.)

Washington.—Injury to Infirm Passenger from Sudden Start.

Where an infirm passenger walking on crutches entered a street car it was the duty of the conductor not to direct the starting of the car until the passenger had secured a seat. (Rice v. Puget Sound Traction, Light & Power Co., 141 Pacific Rep., 191.)

Wisconsin.—Injuries to Passenger from Car Overhang.

Plaintiff having often boarded street cars before they rounded a corner where she desired to board a car, approached the usual stopping place without notice of an ordinance requiring the car not to stop until it had turned the corner. The motorman signaled her to go to the far corner, which she started to do. The car was then approaching a curve at about 3 m.p.h., and the speed was increased to 6 m.p.h. before the car got around the curve, which was on a grade, and, as it did so, plaintiff was struck by the outswing of the car. Held, that there was no evidence of actionable negligence on the part of the carrier. (Kuhn v. Milwaukee Electric Ry. & Light Co., 149 Northwestern Rep., 220.)

Washington.—Duty of Pedestrian at Street Crossing.

While one about to cross a street railway track is not under an absolute duty to stop, look and listen, he cannot, with knowledge that a street car is approaching, step heedlessly in front of it, under the assumption that it will not overtake him.

Though a street car may have been operated at an excessive speed, the company is not liable for injuries to plaintiff from being struck by the car, unless the excessive speed was the proximate cause of the injury. (Beeman v. Puget Sound Traction, Light & Power Co., 139 Pacific Rep., 1088.)

News of Electric Railways

BOARD APPROVES DETROIT CONTRACT

Terms of Contract Published by Board of Street Railway Commissioners—Procedure Outlined for Fixing Price and Transferring Railway to City

The board of street railway commissioners of Detroit on Wednesday made public the text of the contract which it has approved for the purchase of the lines of the Detroit United Railway within the one-fare zone. Publication was also made of the amendment to the city charter which must be passed by three-fifths of the voting electorate before the contract can be carried out by the city. The contract will be submitted to the stockholders of the railway on Aug. 2. If they accept the contract, as officials of the company will recommend to them, the street railway commissioners will take steps to have the Common Council name a date for the submission of the purchase question to the electors. It is understood that the election, if one is called, will be held about the middle of September.

The contract provides that the price of the lines within the one-fare zone shall be fixed by the Circuit Court of Wayne County, sitting as a Court of Chancery. The right of appeal to the State Supreme Court is reserved for both parties under an agreement that the decision of the latter tribunal shall be final and binding upon both.

It further provides that the property shall be delivered to the city on a specific date to be fixed by the circuit judges, which shall be decided within thirty days after suit has been started to fix the price. This provision allows the city to take possession of the lines within sixty days after the election, inasmuch as the suit must be started within thirty days after election.

The contract provides that the city shall accept the property subject to, and shall pay, the existing mortgages upon the property delivered to the extent of the price fixed by the court, and the balance of the mortgage debt, if any, shall be discharged on maturity by the railway. If the price exceeds the mortgage debts, the excess shall constitute a lien on the property. The city shall be obligated for the existing mortgages only to the amount of 2 per cent of the assessed valuation of the city (about $11,000,000). The amount, not to exceed the prescribed 2 per cent, shall be fixed in the decree and shall consist of at least $1,000,000, falling due on June 1, 1916, and of a portion of the first consolidated mortgage falling due on Jan. 1, 1932. All of the purchase price in excess of the amount assumed as a personal obligation by the city shall be secured by a lien due on or before Jan. 1, 1932. Payment of this sum shall be provided for from a sinking fund to be set aside from the earnings of the lines. Interest on the mortgage indebtedness which the city assumes is also to be paid from earnings.

Provision is made that in order to bind all the mortgage bondholders to the terms of the contract, the trustees of the mortgages shall be made party to the suit. The railway agrees that they shall all enter their appearances in the suit "in order that all persons interested may be before the court, all interests protected and a perfect title passed."

Accompanying the contract and charter amendment, the commissioners issued a statement explaining from their point of view what the contract really contained. They urge that the people trust the Circuit Court judges to give justice to both parties, and indicate their idea of what the city can accomplish through municipal ownership in the following language:

"The whole plan of the commission is to pay for the entire property and its extensions out of earnings, but this involves a longer time than sixteen years. If no extensions were necessary, the profits would pay the purchase price and operating charges at the present rates of fare by 1932, but as extensions and improvements are necessary to a large extent, a longer term will probably be necessary, and in the meantime two methods of procuring the necessary additional capital have been provided by the charter amendment. (Pledge credit of city up to $11,000,000, and pledge earnings of lines.)

"It is the confident belief of the members of the commission that outside of a part of the $1,000,000 due on June 1, 1916, it will never be necessary to call on the city to issue any of its own bonds to meet payments, but the earnings of the railway, plus the borrowing power based upon the pledge of future earnings, will take care of all future payments."

COMPLAINT FILED AGAINST CITY

Puget Sound Traction, Light & Power Company Alleges Policy of Harassments Is Being Pursued by the Municipality of Seattle

The Puget Sound Traction, Light & Power Company, Seattle, Wash., on July 23 filed a complaint against the city of Seattle with the State Public Service Commission, alleging that the municipality has entered into a campaign of harassments against the company. In filing the complaint the company asks that a date for a hearing be fixed, and that an order be entered declaring the provisions in its franchises requiring payment for bridges, paving, filling and maintenance of streets, and the payment of a percentage of the gross receipts of its railway system, discriminatory and void.

The company sets forth that in accepting its franchises it was with the understanding that the corporation should not be harassed by the city of Seattle. Instead of following that policy, the city has entered into competition in the light and power field and in the operation of street railway lines, and has adopted a program of harassments, causing the company to lose large sums of money in defending itself against demands made in conflict with the terms of its franchises. One specific instance cited is the fact that the City Council passed an ordinance requiring the sale of twenty-five tickets for $1, or six for 25 cents, in conflict with the franchises, and that before the court nullified the ordinance the requirement cost the company approximately $60,000 in loss of revenues.

The complaint also cites the fact that paving improvements planned by the city will cost the traction company $223,000 in paving that portion occupied by tracks, and that the 2 per cent of the gross earnings paid into the city yearly amounts to about $70,000. The petition prays that the company be relieved of these burdens. The complaint further refers to the passage of a bill requiring the company to build a line on East Union Street, where it had no franchise, and the effort made to convict officials of the company in criminal proceedings for failure to build such a line.

The entry of the jitney bus as a common carrier competitor is further cause for complaint. It is stated that the city, in the autumn of 1914, without lawful authority, issued licenses to more than 500 jitney buses to operate as common carriers along lines of the street railway. The company asserts that its loss of revenues from Nov. 1 to April 1 has amounted to from $45,000 to $60,000.

Reference is also made to the practice of the city lighting department in making excessive charges for street lighting, paid by the general public, in order that rates may be reduced to private and small consumers. This excess charge, it is said, amounts to $80,000 per year. In other words, the city charges itself for street lighting $80,000 a year more than what the same service could be obtained for from the complainant.

P. R. T. OUTLINES OBJECTIONS

Philadelphia's application for a certificate of public convenience, the next step toward building the Broad Street subway and the Frankford elevated, was argued on July 26 in Harrisburg before the Pennsylvania Public Service Commission. Appearing in opposition to granting the certificate were E. A. Ballard, chief counsel Philadelphia Rapid Transit Company; Ruby R. Vale, counsel for D. E. Dallam, whose suit for an injunction was described in the ELECTRIC RAILWAY JOURNAL of July 24; and Charles L. Fluck, of the Northwest Business Men's Association. City Solicitor Ryan was present on behalf of the municipality, and A. Merritt Taylor, Director of City Transit, was the sole witness heard.

All parties will submit briefs, which must be on file within ten days from July 30.

After Director Taylor had offered testimony that the city was legally qualified and financially capable of building the lines in question, Mr. Ballard announced the arguments that the company will submit in an effort to hold up construction of those lines. The company's brief will cover these points:

1. That by the act of March 23, 1866, the city of Philadelphia is prohibited from constructing a railroad on or along Broad Street.

2. That by the act of March 26, 1873, which virtually formed a contract between the State of Pennsylvania and the Thirteenth and Fifteenth Streets line, it was set forth that no other line should be built along Broad Street. According to Mr. Ballard, the Supreme Court has decided that this contract cannot be abrogated except by condemnation proceedings, and such proceedings have not been instituted.

3. That the contract of 1907, section 3, provides that Councils shall determine the routes and other conditions under which railway lines shall be built, and that the Philadelphia Rapid Transit Company shall have ninety days' option on the right of building necessary lines.

MERALCO INCOME FOUND ADEQUATE

Commission Reports on Financial Ability and Service of Manila Electric Railroad & Light Corporation—Fenders, Brakes and Training Suitable

The Board of Public Utility Commissioners at Manila, P. I., recently handed down a full decision covering various points raised in the investigation of the Manila Electric Railroad & Light Corporation. The company's contention that under existing rates its revenues from transportation are not sufficient to provide for the adequate maintenance and depreciation of the property used in the service, the safeguarding of the investment therein and a reasonable return thereon, is not sustained. The commission expresses its belief that the city of Manila is paying such a return on the investment as would entitle it to a thoroughly adequate and up-to-date service.

In rendering its final decision, the board took into consideration the full financial statement of the cost of the property operated as of Dec. 31, 1913. This was obtained from the holding company incorporated in New Jersey. The total investment shown by it on that date was 10,630,283 pesos, as compared to 11,107,300 pesos, the valuation set by Manager Duffy a year ago for the local holdings. Several items on this statement were not allowed, however, and the final estimate of the capital investment made by the board was between 7,500,000 and 8,000,000 pesos.

In its decision the board took up numerous points in connection with the street car service in Manila, complained of by the Philippine Chamber of Commerce. In conclusion it required the company to use vacuum cleaners on its cars during the dry season, to prohibit expectorating in the cars and the placing of the feet on seats by passengers, to brace all its open cars both longitudinally and transversely, to treat the roofs of all cars with waterproof preparation before the setting in of the rainy season, to provide all car windows with clutches, to prohibit passengers from riding on the sideboards or side steps of the open or closed cars, and to prohibit all overcrowding of passengers either on the front or rear platforms of open or closed cars.

The attention of the board had been called to street railway accidents which had occurred in Manila, with the charge that these were caused by defective brakes, improper training of motormen and inadequate inspection of rolling equipment. In answer to these complaints the company had asserted that the street railway accidents in Manila were comparatively infrequent; that the motormen were subject to physical examination and were duly instructed before being allowed to take charge of cars; that all cars and equipment were inspected once in every forty-eight hours; that owing to the fact that there were no rains and the rails were always dry and clean and the cars not heavy, the brake equipment was adequate, and that each car having its own motors was equipped with fenders which were approved by the municipal board in accordance with the company's franchise.

In connection with these points the commission decided mostly in favor of the company. It stated that it was not satisfied that the fenders at present in use were unsafe or inadequate. Until some type was offered which could be employed in the narrow streets of Manila with more decided advantage, the defendant company would not be obliged to make any change. Moreover, in the light of local conditions, the commission was unable to find that the present brake equipment was inadequate and unsafe. In view of the results of the investigation of the company's personnel, the commission found that the employees were adequately trained for the operation of the cars.

ULTIMATUM IN DES MOINES

The Harris Trust Company, Chicago, which controls the Des Moines (Iowa) City Railway, has delivered an ultimatum to the Des Moines Council, through the Des Moines Chamber of Commerce, in regard to the local franchise situation, which has been hanging fire for several months. The amount of capitalization has been the question which all former attempts at a franchise agreement have failed to solve. The company, reducing its capitalization from $5,400,000 to $5,000,000 in an effort to meet the issue, has been unable to appease Mayor Hanna, who demands a figure of less than $5,000,000. A committee of the Chamber of Commerce, trying to mediate the differences between the City Council and the company, recently went to Chicago and sought to have the capitalization figure reduced from $5,000,000. The substance of a letter in reply to this effort follows:

1. The Des Moines City Railway will not consider or discuss any further reduction of capitalization, which means that it will not continue the negotiations unless a capitalization of $5,000,000 is recognized.

2. Unless a settlement of the franchise is secured, the company will fight its receivership through with the purpose of attempting to override the decision of the State Supreme Court and secure a decision in the Federal Court that the franchise voided by the State Court is perpetual.

3. The owners of the system are tired of being pushed by the city hall officials and now regret the $1,000,000 spent in improvements since the dispute started. If the company had obeyed the order of the Supreme Court and torn up its tracks, the City Council thus would have been forced by public sentiment to a settlement as the result of public inconvenience.

The company is still willing to try for a franchise if a basis of agreement can be reached, but at present negotiations are at a standstill while members of the Council and the Chamber of Commerce committee are on vacations.

RHODE ISLAND ARBITRATION BEGUN

Arbitration proceedings were begun on July 26 at Providence, R. I., between the Rhode Island Company and its employees to fix wages and hours of labor. James H. Vahey, Boston, Mass., represented the employees' union, and James M. Swift, Fall River, Mass., appeared as counsel for the company. President A. E. Potter was the principal witness.

Mr. Potter stated, in answer to inquiries, that his salary is $12,000 per year. Upon consultation, it was agreed that a list of the salaries of various other officials should be filed confidentially with the arbitration board, in order to avoid the effects of publicity. Mr. Potter said that the company in conference proposed an increase to the employees, the offer being a guarantee of six hours per day at 25 cents per hour minimum, with 0.5 cent increase if the revenue increased, and a further increase of 1 cent if the revenue increased further. This was in place of arbitration, and was made particularly for the benefit of the spare men, as far as hours of labor were concerned. The regular men outnumber the spare men by about two to one. The present wage scale is from 23 cents to 28.5 cents per hour. Mr. Potter said that the 0.5 cent increase offered was contingent upon an increase of 2 per cent in the gross earnings of the coming year, the adjustment being made quarterly. He

said that it was impossible to eliminate finances from consideration in discussing wages.

Mr. Potter felt that the men are getting a living wage, and that an increase is not necessary as the men are living reasonably well. He could not see how the men deserve an increase when those on other roads are getting less and could be employed for less. During the strike the company did not try to get these men. None were advertised for, and the company took only those that came along and applied for work. Mr. Potter said that if fares could be increased he would like to see the employees get higher wages. The company has 1000 cars representing an investment of $5,000,000; 400 miles of track representing $15,000,000; a $5,000,000 power plant and a tunnel worth $1,000,000. The physical characteristics of the system were briefly reviewed, and Mr. Potter said that more than half of the men have worked over four years for the company. He considered platform work unskilled labor, comparing the motorman to a truck driver and the conductor to a clerk.

Recalled to the stand on the second day, Mr. Potter said that in his opinion the fact that the men receive free transportation and overtime compensation offsets the time required to work up conductor's day cards. On the entire system from thirty to forty accident reports are usually made out, covering minor troubles as well as serious difficulties. Some of the men find suburban runs more difficult than those in Providence. The witness did not feel that the work in Providence is more difficult than that in other places. He thought that in Springfield, Mass., and Pawtucket, R. I., the work was more difficult. Counsel for the union initiated a line of questions relative to the comparative cost of living in Providence and elsewhere, but on objection of counsel for the company this topic was withdrawn before the board ruled, on the ground that it would unduly lengthen the proceedings. Relative to the quality of work done in the shops, Mr. Potter said that in the opinion of some of the foremen the work has been done less well since the organization of the union.

HASTY BUT LEGAL ACTION IN TORONTO

Chairman D. M. McIntyre of the Ontario Railway & Municipal Board has issued his judgment upon the Toronto Railway's application for an order compelling the city to relay the tracks on Yonge Street. The judgment, which is in favor of the city, is, in effect, that the purchase of the Toronto & York Radial Railway's tracks and equipment by the Toronto Railway did not give the company the legal right to operate the section of line referred to, and that while the company has franchise rights on the street it can exercise them only by complying with the terms of the general agreement—by submitting plans to the city engineer, etc., for a new line or extension.

The appeal to the board arose out of the action of the city on June 26 in tearing up 1320 ft. of track south of Farnham Avenue, immediately after the Toronto & York Radial Railway franchise for that part of Yonge Street expired. The Toronto Railway, which had a few hours before purchased the track and overhead equipment, intending to give a service on that section, appealed at once to the board for an order restraining the city from proceeding further and for an order compelling the city to relay the tracks, claiming that since the Toronto & York Radial Railway franchise had expired the Toronto Railway automatically came into possession of rights on the stretch.

Counsel for the city denied the jurisdiction of the Ontario Railway & Municipal Board to deal with the matter, and held that in any case the city was within its rights in removing the tracks. The only way the company could operate there was by submitting plans for tracks, etc., to the city engineer in the regular way. The board, after asserting its jurisdiction, proceeded in the judgment to deal with the claim of the company that it acquired a franchise right on the section of Yonge Street referred to when the Toronto & York Radial Railway franchise expired. This claim, which was not argued by the city, the board finds to be a just one, but by referring to the terms of the agreement between the company and the city the board takes the position that while the franchise right exists and the company owns the tracks and overhead equipment, it cannot make the track a part of its system. The portion of Yonge Street dealt with must be regarded as the proposed site for an extension of the company's railway, which brings it under the conditions respecting such extensions. In the judgment Chairman McIntyre took a thrust at the city for causing inconvenience to the public by tearing up the tracks. Referring to the number of complaints received from residents and ratepayers of the district, Mr. McIntyre pointed out that the city acted within its strict legal rights and that the board was obliged to determine the issue solely upon that basis. He added: "If the city authorities have caused discomfort and loss to citizens by destroying, needlessly and in haste, property which might under some interim arrangement have continued to serve the transportation requirements of a portion of the community, the citizens must carry their complaint to the city authorities."

DEADLOCK ON TOLEDO DRAFT APPROVAL

Until late in the afternoon of July 29 the franchise committee and representatives of the Toledo Railways & Light Company, Toledo, Ohio, discussed the question of whether the committee should recommend the tentative draft of the franchise to Council and whether that body will take action on it or simply file it for reference to the voters at a referendum election. It was not possible, however, to reach any agreement, and the meeting was finally adjourned until the afternoon of Aug. 3.

At the conference on July 28 a deadlock between the committee and Henry L. Doherty developed on this point. Mr. Doherty said the negotiations would be of no avail if Council did not take some action on the tentative draft before it is sent to the people. He continued:

"I would rather go to the people with Council's rejection and say this administration has failed to do its plain duty than have Council sit back and take no action whatetver. This draft is according to your views and you frankly state that it protects the people. They are entitled to know the result of your work and to ask you whether the draft is a good one or not."

Member F. M. Dotson said that he believed the report to be made to Council would accomplish the purpose of a recommendation, and that the Council members believed the proposed franchise would provide for "a well-operated system, good service, minimum rates and a workable plan for obtaining municipal ownership." Mr. Doherty replied that if the committee would say that in so many words to Council, it would be all he would ask. Mr. Dotson, however, would not agree to that, and insisted that Council could only receive and file the report. He argued that if Council accepts and files the draft, the act would show that it is satisfied. Mr. Doherty asserted, however, that such a course would mean dodging the issue and that all he wanted was for Council to declare itself one way or the other. If the draft is not recommended, then some other course can be taken to get it to the voters. "We do not want to be placed in a position where Council, after accepting the report, can go out and fight the franchise," said Mr. Doherty.

N. Y. CONTRACTS LET AND APPROVED

A contract for the installation of tracks on the New Utrecht Avenue elevated railroad in Brooklyn has been awarded by the commission to Ward & Tully, Inc., the lowest bidders, for $71,355. The work must be completed within five months after the delivery of the contract. The New Utrecht Avenue line is a three-track elevated railroad, extending from Thirty-eighth Street, Brooklyn, over the route of the so-called West End line of the Brooklyn Rapid Transit Company to Coney Island. It will be operated by the New York Consolidated Railroad Company as a branch of the Fourth Avenue subway.

The commission has approved the plans and form of contract for the supply of special work for the new rapid transit system in Queens and will open bids on Aug. 18. The special work consists largely of frogs and switches and will be used upon the new elevated railroad from the Queensboro Bridge to Corona, on the junction section on the Queensboro Bridge Plaza, for the new elevated railroad from the Queensboro Bridge to Astoria, and for the extension of the Queensboro subway from its present terminus

at Jackson and Van Alst Avenues, Long Island City, through Davis Street and Ely Avenue to the Queensboro Bridge Plaza.

The commission has approved plans and form of contract, submitted by the New York Municipal Railway Corporation, for the erection of steel, construction of tracks, etc., on the Broadway elevated railroad in Brooklyn between Myrtle Avenue and Aberdeen Street, in connection with the third-tracking of that line. The commission also approved the company's plans and form of contract for the supply of structural steel for widening and strengthening the Myrtle Avenue elevated railroad from Willoughby Avenue to Wyckoff Avenue for the third-tracking of that line. The company must submit both contracts to public bidding.

Agreement with Employees Extended in Toronto.—The agreement that existed between the Toronto (Ont.) Railway and the 2100 members of the company's employees' union for the last three years has been extended for another two years.

Electrical Prosperity Week Indorsed.—The Electrical Supply Jobbers' Association has passed a series of resolutions indorsing "Electrical Prosperity Week" and giving its whole-hearted support and co-operation to the movement. This week occurs Nov. 29-Dec. 4, 1915.

New Line Opened in Washington.—On July 28 the Washington Railway & Electric Company, Washington, D. C., put into operation a direct line between the northwest suburbs of the city and the government buildings on Fourteenth Street, south of the Mall. The line was established as a connecting link on the Fourteenth Street line between G Street and E Street, thus making the third north and south line to intersect Pennsylvania Avenue between the Peace Monument and the Treasury Building. On account of the cut off, several changes were made in the route of other lines.

Market Street Injunction Stayed in San Francisco.—The injunction issued to prevent the operation of San Francisco (Cal.) Municipal Railway cars over the outer tracks on lower Market Street, noted in the ELECTRIC RAILWAY JOURNAL of July 10, was stayed indefinitely on July 20 by a decision handed down by Judge Troutt of the Superior Court. In granting the city's petition Judge Troutt supplemented his written opinion with the statement that he intended the stay to be effective until the United Railroads of San Francisco could get a ruling from the Supreme Court as to his right to intervene in the injunction proceedings.

Injunction Issued in Montreal Franchise Case.—Justice Lafontaine in Practice Court on July 20 ruled that an interlocutory injunction should be issued to restrain the Board of Control and the City Council from further dealing with the Montreal (Que.) Tramways franchise renewal question, until such time as the Court shall have been afforded an opportunity to enter upon deliberations as to the merits of the allegations and counter-allegations arising from the board adopting, on the vote of Mayor Martin and Controllers E. N. Herbert and Thomas Cote, Controller Herbert's proposal of a thirty-year franchise agreement with the company.

New Pavement the Issue in East Cleveland.—The Cleveland (Ohio) Railway has notified the village of East Cleveland that it will not lay the new pavement between its tracks on Euclid Avenue through the town unless it is assured of a renewal of its franchise in 1921. The company, however, wants to make the fare 5 cents and the village has demurred. It has notified the company that the pavement will be laid, and the company held for the expense. The village asserts that the company has no franchise for a short stretch of its St. Clair Avenue line, and, if it does not do the paving on Euclid Avenue, the St. Clair Avenue cars will be stopped until the bill is paid. This would necessitate some arrangement to take care of the passengers on that line, which is the only one reaching Euclid Beach at the present time.

Trolley Pole Agreement Reached in Springfield.—An agreement has been reached between the city planning commission of Springfield, Mass., and the Springfield Street Railway relative to arrangements for the removal of trolley poles in the heart of the business district between State Street and the Union Station. The company has consented to meet the cost of substituting span suspensions with attachments to abutting buildings for the existing poles, the estimated outlay being about $5,000. About forty property owners are to be visited by the commission, and to each will be submitted a form of agreement which gives the company virtually a license to attach span wires but nothing in the way of an easement. If the owners consent, the City Council will be asked to grant the company the right to string span wires over the sidewalks, and the Massachusetts Public Service Commission will pass upon the plan.

Public Utility Committee Drafts Report.—The completed draft of the amendment proposed by the committee on public utilities of the Constitutional Convention was made public on July 24. The proposed article will permit the Legislature to limit the courts' powers of review, a prerogative the Legislature already possesses under the present constitution. The other principal provisions are as follows: (1) The public service commissioners shall be constitutional officers. (2) The terms are fixed constitutionally at five years. (3) The commissioners may be removed only by majority vote of the Senate upon "recommendation of the Governor stating grounds upon which such removal is recommended." (4) Each commission shall have the jurisdiction, powers and duties it now has, but nothing shall prevent the Legislature from enacting laws changing such jurisdiction, powers and duties; except that the Legislature shall not enact any law prescribing rates or standards of service until after it has received from one of the commissions a report thereon or until after the expiration of a prescribed period.

Board of Estimate Favors Tube Plan.—The Board of Estimate and Apportionment of New York City on July 21 unanimously adopted a resolution, introduced by President McAneny of the Borough of Manhattan, to notify the Public Service Commission for the First District of New York that in its opinion a tunnel should be substituted for the bridge plan for the connection of the new subway system with the Borough of Queens under the East River at Fifty-ninth Street. It was also stated that the board was prepared to supply the necessary funds for the tunnel work. The total estimated cost for the tunnel plan would be $4,740,000 as compared to $2,340,000 for the bridge connection. The board was assured by contractors that the tunnel could be completed within thirty months after the delivery of the contract, which would be about the time it would take to complete the unfinished sections of the new system. The Public Service Commission has withdrawn its objections to the tunnel plan and adopted a new route, No. 61, which will be a two-tracked subway under the East River from Fifth Avenue to the Queensboro Bridge Plaza.

PROGRAM OF ASSOCIATION MEETING

Railway Signal Association

The Signal Appliance Association has issued Bulletin No. 10. This submits information regarding the arrangements for the forthcoming convention of the Railway Signal Association, which will be held in Salt Lake City, Utah, on Sept. 14-16. The bulletin states that there will be no official exhibits at the convention, although informal exhibitions of devices at the meeting place will be encouraged. Arrangements have been concluded for a special train from Chicago, leaving at 11.55 p. m. Saturday, Sept. 11, over the Chicago & Northwestern Railway. The train will stop at Omaha, Ogden and Cheyenne to pick up passengers from connecting lines. It will arrive at Salt Lake City on Monday, Sept. 13, at 6.10 p. m. No special trains have been provided for the return trip.

The headquarters of the convention will be at the Hotel Utah in Salt Lake City, and reservations for rooms are to be made by members and guests direct with the management of the hotel. No formal program for the committee reports has been arranged at the present time, but Secretary Rosenberg of the Railway Signal Association will issue a complete statement on the first day of the convention. The annual banquet of the association will be held on the evening of Wednesday, Sept. 15.

Financial and Corporate

ANNUAL REPORTS

Brooklyn Rapid Transit Company

The comparative statement of income, profit and loss of the Brooklyn (N. Y.) Rapid Transit Company for the years ended June 30, 1914 and 1915, follows:

	1915	1914	Per Cent
Revenue from operation:			
Transportation	$26,096,265	$25,246,452	+ 3.37
Miscellaneous	331,421	311,797	+ 6.29
Total	$26,427,686	$25,558,249	+ 3.40
Operating expenses:			
Maintenance of way and structures	$2,391,814	$2,021,647	+18.31
Maintenance of equipment	2,401,841	2,315,990	+ 3.71
Operation of power plant	1,553,177	1,463,283	+ 6.14
Operation of cars—trainmen's wages	4,787,574	4,520,022	+ 5.92
Operation of cars—other expenses	1,744,690	1,696,132	+ 2.86
Damages	607,700	543,885	+11.73
Legal expense in connection with damages	261,153	219,758	+18.84
General law expenses	53,406	65,097	—17.96
Other general expenses	819,754	822,856	— 0.38
Freight and mail expenses	338,414	325,054	+ 4.11
American Railway Traffic Company—expenses	854	823	+ 3.76
Total	$14,960,381	$13,994,552	+ 6.90
Net revenue from operation	$11,467,305	$11,563,697	— 0.83
Income from other sources	438,715	451,771	— 2.89
Total	$11,906,020	$12,015,468	— 0.91
Deductions:			
Taxes	$1,700,035	$1,752,879	— 3.01
Interest and rentals (net)	4,693,424	4,946,884	— 5.12
Total	$6,393,459	$6,699,763	— 4.57
Net income	$5,512,561	$5,315,705	+ 3.70

The net income shows an increase of $196,856 or 3.7 per cent over the preceding year, and in addition the system's reserves for depreciation were credited with $256,384 as compared to a debit in the preceding year of $53,191. The figures for the current fiscal year include the operations of the Coney Island & Brooklyn Railroad for the entire year, whereas for the preceding year those operations were included for only six months. The accumulated surplus on June 30, 1915, after making sundry adjustments to the profit and loss account, and after the payment of dividends at the rate of 6 per cent per annum on the entire amount of capital stock outstanding during the year, namely, $74,520,000, was $10,621,966, an increase of $889,377 over the surplus on June 30, 1914.

The report calls attention to the fact that, excluding for comparison the newly acquired Coney Island & Brooklyn Railroad lines, the passenger earnings of the system failed for the first time in the history of the company to show a substantial increase over the passenger earnings of the preceding year. Instead there was a decrease, which is attributed to two main causes: (1) The general depression in business and industry affecting Brooklyn as well as other portions of the country, reflected in a large number of men and women out of work and a tendency toward economy in expenditures. (2) The very liberal increase in transfer facilities which went into effect on June 1, 1914, under order of the Public Service Commission, whereby the total number of transfer points on surface railroads in the system was increased from 721 to 1008. The first year of operation under this order shows an increase of 10,552,274 transfer passengers carried, and a decrease of 2,141,700 cash passengers. This situation presented not merely a loss in revenue but occasioned an increase in expense by reason of the increased service required for the transportation of the large number of additional transfer passengers. Of the total increase of 6.9 per cent in operating expenses, nearly half, or $456,018.38, was due to charges to maintenance of way and structures and equipment, and $267,551.52 to trainmen's wages.

The report reviews the progress of work on rapid transit lines under contracts with the city, and expresses the opinion that owing to delays in letting contracts for construction the enlarged system will not be completed and ready for operation on Jan. 1, 1917, as expected. A synopsis of the company's rapid transit work shows that four tracks in the Centre Street loop have been completed; the Thirty-eighth Street construction substantially progressed; the four-track Sea Beach line completed and placed in operation; two tracks of the Fourth Avenue subway between Chambers Street and Sixty-fifth Street equipped and operation thereover begun; Broadway and Myrtle Avenue connection and the Lutheran Cemetery line completed; all of the Liberty Avenue elevated extension completed except the stations; first section of the Jamaica Avenue elevated extension begun; third-tracking of the elevated lines progressed; 300 new subway cars ordered, 160 of which have been delivered; comprehensive contract for signal equipment for rapid transit lines entered into and numerous additions to power plant supplied. The total expenditures for rapid transit work by the New York Municipal Railway Corporation to June 30, 1915, were $30,010,860. The pooling of earnings with the city, which began on Aug. 4, 1913, shows a deficit to June 30, 1915, in meeting the company's preferentials of $545,413, and a deficit in meeting the city's interest and sinking fund of $714,722.

Among the items of maintenance, additions and improvements on other than rapid transit lines, were the relaying of 83,930 ft. of surface track; overhauling and repairing of an additional 96,072 ft. of surface track; the installation of 154 pieces of special work; the laying of 146,578 sq. yd. of improved pavement; the renewal of 51,658 lin. ft. of track on elevated lines; the painting of 22,593 lin. ft. of elevated structure; the building of 140,508 lin. ft. of footwalk on elevated structure, and the installation of 16,789 ties on elevated track and 39,630 lin. ft. of timber guard rail.

During the year the company expended in the maintenance and improvement of the club rooms for employees, in support of the pension system, in medical inspection service and in sickness and death gratuities in cases not reached by the employee's benefit association, the sum of $78,742. The system of compulsory medical inspection accomplished during the past year a reduction in the amount of time lost by the operating employees on account of sickness of 13,485 days (or nearly 18 per cent) over the time lost in the year ended June 30, 1914. The milder winter of 1915 accounted for about 7000 days of the total reduction. Making due allowance for this, however, there still remains a saving of upwards of 6000 days' work for the year, or a reduction of 8.6 per cent over the sickness record of the year ended June 30, 1914. The system was also accompanied by a reduction of 24 per cent in the number of days' work lost by operating employees on account of illness.

On account of the high rate of insurance fixed by the New York Fire Insurance Exchange two years ago the company was obliged to insure its risks with London Lloyds, where a much lower rate was obtainable. Last year the local exchange offered a rate lower than Lloyds, and about 20 points lower than the rates fixed in the preceding year, so that the insurance was placed for three years with domestic companies at an average rate of 0.25387, which has since been reduced to 0.23358. The company's insurance reserve fund has reached $787,439, an increase of $188,242 during the year.

Liverpool Corporation Tramways

The report of the Liverpool (England) Corporation Tramways for the year ended Dec. 31, 1914, shows that the total revenue for the year amounted to £722,307, operating costs (including rental of leased lines) £473,678, and gross profit £248,629. The gross profit was apportioned as follows: Interest, £50,082; sinking fund and repayment of loans, £63,726; reserve, renewal and depreciation account, £34,821, and contribution in aid of the general rate, £100,000. The net profit for the year amounted to £134,821, a decrease of £19,341 as compared with 1913.

The following figures may prove interesting in connection with the financial position of the tramway since it came into the hands of the city: The total sum set apart for sinking fund and redemption of debt up to Dec. 31, 1914, amounted to £1,177,949; reserve, renewal and depreciation,

£800,623; contribution in relief of rates, £572,898. In addition, the sum paid by the tramways since 1897 in rates and taxes amounts to £401,383.

The number of passengers carried, miles run and traffic receipts for 1914, compared with 1913, are as follows:

	1914.	1913.	Increase.
Passengers	145,656,374	144,085,927	1.1%
Receipts	£684,026	£677,881	0.9%
Mileage	13,657,888	13,442,605	1.6%

From the above figures it will be seen that there was an increase in the traffic receipts of £6,145, notwithstanding the fact that the country was under war conditions for nearly five months. The receipts from Jan. 1 to Aug. 1 showed a progressive increase equivalent to 4 per cent. The average earnings per car mile for the year 1914 amounted to 12.02d, as against 12.10d for 1913, a decrease of 0.08d. This decrease was due to the issuing of one and three-quarter millions of free passes to members of His Majesty's forces.

APPEAL TAKEN FOR BOND ISSUE

Washington Railway & Electric Company Wants Court to Remove Valuation Restriction Imposed by Commission

The Washington Railway & Electric Company, Washington, D. C., on July 20 appealed to the Supreme Court of the District of Columbia to set aside a ruling by the Public Utilities Commission which declined to approve a bond issue of $341,000 requested by the railway. The company a few months ago asked for a total issue of $694,000 in bonds, but the commission would allow only $353,000 to be issued at that time or until the commission had completed its valuation of the company's property. Previous references to this case were made in the ELECTRIC RAILWAY JOURNAL of Jan. 23 and April 3.

Eight different reasons are set forth in the company's petition to substantiate its claim that the failure or refusal of the commission to approve the bonds is illegal. It has no assurances when, if ever, the valuation will be completed by the commission. The commission makes a distinction between issues of bonds for capital charges sought voluntarily by the company and those made under express direction of Congress, issues of the latter class always having been approved.

There is no question, says the company, as to the legitimacy of the charges or of the fact of actual expenditure. It is asserted that the law does not contemplate the completion of valuation before action by the commission on its application. The commission is not required to have before it the relation which the value of the property bears to outstanding stocks and bonds before approving the issue. Ascertainment of valuations cannot lawfully enter into or affect the question of the legitimacy of the capital expenditures for which issuance of bonds is desired.

The question of present capitalization is not drawn into controversy, the company contends, by the application for approval of bonds. Even if it were, the company shows that all of its outstanding stocks and bonds were issued and applied under the act of June 5, 1900, and before the creation of the Public Utilities Commission, and that the commission cannot lawfully affect or disturb the existing capitalization fixed with the express sanction of Congress.

The company explains that between Jan. 1, 1909, and Nov. 30, 1914, it expended for additional equipment and extensions the sum of $457,849. It asserts that it is entitled to have its requested issue of $694,000 of bonds approved and asks the court to set aside so much of the order of the commission as denied the right of the full issue.

BRISTOL TRAMWAY SALE NEGOTIATIONS

Some time ago the option committee of the Bristol Corporation and the representatives of the Bristol (England) Tramways met to see if any arrangement could be arrived at between the two sides with regard to the future of the tramway undertaking. The company broke off negotiations and the corporation has now reopened the matter endeavoring to find out from the tramways company whether some arrangement cannot be arrived at so as to secure the full development of the transit facilities in order to meet not only the present but the future requirements of the city and surrounding districts. The corporation lays down various conditions which it would like to see fulfilled, and asks if, in the event of the corporation undertaking not to exercise its option of purchasing the tramways, the company will make an offer to enter into an agreement based on these conditions. In the meantime, however, the Bristol Tramways Company is applying for powers to extend its business. It desires not only to continue in the tramway business but to carry on the business of motor-car manufacturers, motor-car engine manufacturers, and repairers and dealers in motor-cars and their parts. It also desires power to include the manufacture of airships and aeroplanes, and, quite naturally at present, power to manufacture ammunition, arms and the like. The company has orders for armed motor-cars, and it desires to do everything necessary to complete them, putting in the guns, etc. Being a large generator of electricity, the company also desires power to supply electricity to other firms, and in other smaller ways to extend its business.

Boston (Mass.) Elevated Railway.—The directors of the Boston Elevated Railway have declared a dividend of 1½ per cent, payable on Aug. 16 to stockholders of record on Aug. 5. During the year ended June 30 the company paid 5½ per cent in dividends, the dividend for the last quarter being 1 per cent. Through Boston bankers the company has sold an additional $1,000,000 of 5 per cent gold debenture bonds dated 1912 and due on Dec. 1, 1942, for 95.68 and interest, to yield 5.3 per cent. As mentioned in the ELECTRIC RAILWAY JOURNAL of June 19 in connection with the award of the bonds to the syndicate, this sale makes $5,000,000 of the issue outstanding.

Federal Light & Traction Company, New York, N. Y.—The voting trustees for the capital stock of the Federal Light & Traction Company gave notice this week that the voting trust agreement would expire by limitation on July 29 and that on and after that date the voting trust certificates might be surrendered and exchanged for proper certificates for the common stock of the company. All holders were required to surrender their certificates on and after the date mentioned to the National City Bank of New York, depositary.

Fort Wayne & Springfield Railway, Decatur, Ind.—The Fort Wayne & Springfield Railway will be offered for sale on Aug. 12. Each bidder must deposit a certified check for $5,000 and must enter into a contract to pay the balance of the purchase price within sixty days. This will be the fifth time the property has been offered for sale, there being no bidders three different times. In connection with the last sale, held on May 4, the bidder forfeited the $1,000 deposit then made. Various petitions carrying extensions of the time and asking that the $1,000 be protected were taken into court, but the court finally fixed upon Aug. 12 as the final date for the sale. On July 17 F. A. Dolph filed a petition asking that the line be sold to him for $130,000 and agreed to post the guarantee then. Upon objection Mr. Dolph withdrew the offer. Previous references were made in the ELECTRIC RAILWAY JOURNAL of March 13, May 22 and June 19.

Jacksonville (Fla.) Traction Company.—A quarterly dividend of three-fourths of 1 per cent has been declared on the 6 per cent cumulative preferred stock of the Jacksonville Traction Company, payable on Aug. 2 to holders of record of July 23. Previous payments of 1½ per cent were paid quarterly.

Montreal (Que.) Tramways.—The new issue of $1,000,000 of common stock for the Montreal Tramways, noted in the ELECTRIC RAILWAY JOURNAL of July 24, will be allotted pro rata to the holders of the $3,000,000 of stock now outstanding; that is, one share of new will go to the holder of every three shares of old. The proceeds of the issue will be used for the general purposes of the company.

New York (N. Y.) Municipal Railway Corporation.—The Public Service Commission for the First District of New York has approved an agreement between the New York Consolidated Railroad and the Nassau Electric Railroad, by which the former leases for 999 years the terminal of the latter company at Coney Island. The consideration is

the payment of $247,000, which the commission has authorized the New York Municipal Railway Corporation to charge against the cost of construction under the dual system contracts. In accordance with the agreement between the Consolidated Company and the Nassau Electric Company, the city and the New York Municipal Railway Corporation will agree to a modification of the dual system contract whereby the city will obtain a right-of-way for two tracks into the Coney Island terminal between Avenue Y and Surf Avenue for the use of the trains to be operated over the New Utrecht Avenue elevated railroad. The Sea Beach Railroad has already obtained the right-of-way into the terminal for its trains, so that by the new agreements trains to Coney Island through the Fourth Avenue subway, whether operated over the Sea Beach line or over the New Utrecht Avenue line, will both enter the same terminal at Coney Island.

Pacific Gas & Electric Company, San Francisco, Cal.—The Pacific Gas & Electric Company has filed an application with the California Railroad Commission for authority to buy all the capital stock of the West Sacramento Electric Company from G. F. Detrick and H. W. Furlong for $30,000. The West Sacramento Electric Company operates in Yolo County. It has a capital stock of $100,000, divided into 1000 shares. The stock is in the hands of the Mercantile Trust Company of San Francisco in escrow. The Pacific Gas & Electric Company obtained options from Messrs. Detrick and Furlong on all of it some weeks ago. This company already owns and operates the electric railway lines in the neighborhood of the territory owned and served by the West Sacramento Electric Company.

Puebla Tramway, Light & Power Company, Puebla, Mexico.—The holders of the $4,229,200 of first mortgage thirty-year 5 per cent bonds of the Puebla Tramway, Light & Power Company were to vote on July 30 in London on a modification of the trust deed to make the interest on these bonds for five years from Jan. 1, 1915, payable only in the event of sufficient net earnings after providing each year for $3,000,000 of prior lien 5 per cent bonds. Any part of such interest remaining unpaid at the expiration of the five years would be satisfied, if required, by the issuance at par of 5 per cent cumulative income warrants payable only out of profits. No dividends would be paid on the common stock until the whole of income warrants had been redeemed. Provision is also contemplated for cancelling the operation of the sinking fund for five years from Jan. 1, 1916, and for extending the date of maturity of the bonds for five years from Jan. 1, 1937. The management of the company states that the average rate of exchange for last year was less than half of the par exchange or under 1s. per peso, with the result that the earnings in sterling realized little more than the amount necessary to meet the interest on the prior lien bonds alone. The company does not expect that its earnings will for some time realize in sterling the amount sufficient to pay the interest on its first mortgage bonds.

St. Louis, Lakewood & Grand Park Railway, St. Louis, Mo.—Under an execution entered on a judgment recently given in favor of a former superintendent for salary, a levy has been made on two of the three cars of the St. Louis, Lakewood & Grand Park Railway.

Washington (D. C.) Interurban Railway.—Chief Justice Covington on July 20 authorized the sale of the Washington Interurban Railway. The trustees, J. W. Yerkes and Guy T. Scott, are to conduct the sale in accordance with the decree of the United States District Court in Maryland, where a foreclosure decree was recently entered.

Washington-Oregon Corporation, Vancouver, Wash.—The property of the Washington-Oregon Corporation, both real and personal, was advertised to be sold under sheriff's sale on July 3 to satisfy a mortgage of more than $1,000,000, but the sale was adjourned indefinitely. Attorney Langhorn asserted that one reason for the postponement was the uncertainty existing as the result of certain franchise activities for the use of county roads being carried on by H. D. Fleischhauer, formerly manager for the Washington-Oregon Corporation. The county commissioners have been asked to refuse this grant and have decided to hold off temporarily, but until this matter is settled a stop is placed upon the intentions of the bondholders, who are prepared to buy in the property.

West End Street Railway, Boston, Mass.—The West End Street Railway has sold to F. S. Moseley & Company, Boston, an issue of $4,743,000 of one, two and three-year notes bearing 5 per cent interest. The notes are equally divided between the three maturities, making $1,581,000 of each. It is understood that they were sold at a premium. Several bids, naming longer maturing notes or long-term bonds, were received, but these were rejected, as it was felt it was not advisable to load up with long-term bonds, carrying a large interest rate, which would have to be sold at a heavy discount.

DIVIDENDS DECLARED

Bangor Railway & Electric Company, Bangor, Me., quarterly, one-half of 1 per cent, common.

Bristol & Plainville Tramway, Bristol, Conn., 2 per cent.

Connecticut Railway & Lighting Company, New Haven, Conn., quarterly, 1 per cent, preferred and common.

Cumberland County Power & Light Company, Portland, Me., quarterly, 1½ per cent, preferred.

East St. Louis & Suburban Company, East St. Louis, Ill., quarterly, three-fourths of 1 per cent, preferred.

Illinois Traction System, Peoria, Ill., quarterly, three-fourths of 1 per cent, common.

Jacksonville (Fla.) Traction Company, quarterly, 75 cents, preferred.

Monongahela Valley Traction Company, Fairmont, W. Va., 2½ per cent, preferred.

Tampa (Fla.) Electric Company, quarterly, 2½ per cent.

United Power & Transportation Company, Camden, N. J., $1.34.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
ATLANTIC SHORE RAILWAY, KENNEBUNK, ME.					
1m., June, '15	$28,455	$29,883	†$1,428	$653	†$2,081
1 " " '14	29,863	24,075	5,788	680	5,108
BATON ROUGE (LA.) ELECTRC COMPANY					
1m., May, '15	$14,961	*$8,761	$6,200	$2,166	$4,034
1 " " '14	14,964	*9,650	5,314	2,109	3,205
12 " " '15	181,149	*111,446	69,703	25,127	44,576
12 " " '14	172,632	*112,603	60,029	25,291	34,738
BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.					
1m., May, '15	$9,473	*$8,484	$989	$1,134	†$145
1 " " '14	10,999	*9,936	1,063	1,082	†19
12 " " '15	120,004	*99,754	20,250	13,425	6,825
12 " " '14	122,375	*102,318	20,057	12,899	7,158
CAPE BRETON ELECTRIC COMPANY, SYDNEY, N. S.					
1m., May, '15	$26,611	*$16,410	$10,201	$6,724	$3,477
1 " " '14	29,486	*16,095	13,391	6,438	6,953
12 " " '15	340,034	*207,966	132,068	78,432	53,636
12 " " '14	374,594	*207,657	166,937	74,916	92,021
COLUMBUS (GA.) ELECTRIC COMPANY					
1m., May, '15	$56,471	*$27,395	$29,076	$28,578	$498
1 " " '14	54,086	*25,475	28,611	24,781	3,830
12 " " '15	694,332	*311,858	382,474	343,840	38,634
12 " " '14	641,478	*280,681	360,797	296,720	64,077
DALLAS (TEX.) ELECTRIC COMPANY					
1m., May, '15	$134,612	*$86,273	$48,339	$33,394	$14,945
1 " " '14	184,844	*105,648	79,196	27,493	51,703
12 " " '15	2,012,647	*1,163,449	849,198	402,896	446,302
12 " " '14	2,270,243	*1,336,740	933,503	314,938	618,565
EASTERN TEXAS TRACTION COMPANY, BEAUMONT, TEX.					
1m., May, '15	$58,141	*$31,897	$26,244	$8,713	$17,531
1 " " '14	55,084	*32,836	22,248	8,377	13,871
12 " " '15	672,184	*388,167	284,017	104,205	179,812
12 " " '14	571,267	*362,682	208,585	94,679	‡138,775
EL PASO (TEX.) ELECTRIC COMPANY					
1m., May, '15	$71,624	*$42,642	$28,982	$4,187	$24,795
1 " " '14	83,286	*47,521	35,765	4,201	31,564
12 " " '15	1,004,535	*550,173	454,362	50,337	404,025
12 " " '14	951,588	*521,694	429,894	51,284	‡383,622
GALVESTON-HOUSTON ELECTRIC COMPANY, GALVESTON, TEX.					
1m., May, '15	$169,249	*$101,054	$68,195	$36,059	$32,136
1 " " '14	210,528	*112,367	98,161	35,669	62,492
12 " " '15	2,242,178	*1,245,329	996,849	435,353	561,496
12 " " '14	2,442,273	*1,376,513	1,065,760	433,155	632,605
TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.					
1m., June, '15	$768,699	$490,359	$278,340	$132,696	‡$147,663
1 " " '14	790,334	470,892	319,442	129,607	‡189,835
6 " " '15	4,589,809	3,035,016	1,554,793	800,914	‡768,607
6 " " '14	4,513,204	2,859,475	1,653,729	680,790	‡877,288

*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

LOS ANGELES JITNEYS DECLINING

Strict Regulation Causes Reduction in Craze—First Driver in Pasadena Quits—Interurban Bus Question Put Before Commission

Since July 12 regulation of the jitney traffic in Los Angeles, Cal., has been on a firm and solid foundation, requiring substantial bond or insurance against personal and property damage and proof that the driver meets a certain standard of competency. It is too early to state fully what the effect will be, but hundreds of jitney drivers have quit, because unable either to pay the cost of securing bonds or to pass the reasonable examinations now conducted by the police traffic officials for old and new operators alike.

The ordinance upon which the present regulation is founded is No. 31,877, mentioned in the ELECTRIC RAILWAY JOURNAL of March 6. This contained a requirement for a $5,000 bond. The jitney men's association secured an injunction against its enforcement which remained in effect until after the municipal election last June. Then the injunction was dissolved by Judge Hewitt without any written opinion, and the ordinance became effective on July 1. An amendment, ordinance No. 32,518, was passed by the Council, to become effective on July 20, replacing the requirement of a $5,000 bond by that of bond or insurance (the insurance option being new) in the amount of $5,000 for injury or death of one person, $10,000 for injury or death of more than one person and $1,000 for damage done to the property of others. This insurance or bond must be approved by the police commission. The jitneymen's association has some arrangement with the Pacific Casualty Company whereby protection that is said to satisfy the ordinance is obtained by its members for $24 down and $8 a month. The $24 pays for the first two months, thus making the cost of the protection $104 a year.

Immediately after July 1 there was a great reduction in the number of jitneys on the streets. In the palmy days of the jitney craze the largest number counted in service in a day ran fairly close to 800, and in the middle of June a traffic count showed about 425 jitneys in service. After the first week in July there were less than 250 jitneys actually running. During the interval between July 1 and July 20, the police commission permitted operation by those complying with the ordinance in its original $5,000 requirement, and leniency was shown even in the enforcement of this. On July 12, 306 drivers had filed applications with bonds, and on that day officers were instructed to arrest all who were operating without bonds.

The police traffic department is holding examinations under the ordinance. Applicants are required by a written examination to show a knowledge of rules and orders governing traffic and to pass a road test in which they are accompanied by one of the officers competent to judge their driving. There have been more than 400 applicants examined, of whom about fifty, according to unofficial reports, failed. A great many of these were weeded out by sheer illiteracy or ignorance of the English language. On July 16 the department examined sixty-five applicants, including a few held over from the preceding week. The rate at which new applications have been coming in has been declining, but it is difficult to tell when they will stop. Those who have passed the written tests have usually also passed the road tests, as most of them are men who have been operating jitneys.

The police are not troubled much by attempts to evade the ordinance. The drivers know better, and their association, after the defeat of its efforts to eliminate the bond provision, is now urging peaceable compliance with the law. One driver on the first day of the new regime was taken in for a heart to heart talk with the traffic officers after he had been operating a few hours with a little slotted box tacked up under a sign saying that his vehicle was not a jitney bus, but inviting riders to leave a donation. He promised to quit. The jitneys continue to suffer from overcrowding. It is expected that there may be some regulation of this feature, which many think will result in a wholesale quitting of the service or higher fares.

The question whether the bond requirement applies to buses in interurban traffic entering the city has been taken into court in an action by the proprietors of the "Little Landers" stage, M. Spencer and S. W. Parmenter, which will also involve other features of the ordinance. The whole question of regulation of interurban bus traffic is becoming of increasing importance, as the number of vehicles so engaged is now fairly large. These buses take only the cream of the traffic. An example is the forty cars that run from Santa Ana to the beach on Sunday, but give no service on week days when traffic is light. This subject will be put before the California Railroad Commission under an application filed on July 12 by the Western Association of Short Line Steam Railroads, requesting a determination whether buses in interurban traffic are common carriers and as such subject to the laws, ordinances, rules and regulations governing common carriers. Electric railways will undoubtedly be represented at the hearings. Up to this time the only regulation of interurban buses of interest has been that by the city of Venice, which passed an ordinance permitting the trustees at their discretion to permit buses engaged in interurban traffic to enter the city on payment of a license fee of $100 a year. The trustees have not yet seen the necessity for issuing licenses to them. At first drivers attempted to evade the effect of this by driving to the next beach point, Ocean Park, but the number so doing has been gradually diminishing.

Some light on the troublesome question of jitney receipts is given by the retirement of C. W. Home, the first man to start a jitney bus in Pasadena, who was widely advertised in early newspaper articles as an example of success in the business. He says a good deal of his early traffic was from novelty seekers among people not accustomed to riding in automobiles. Now many people are getting tired of jitneys. He stated to a reporter: "I started in business on April 20, 1914, operating between the business portion of Pasadena and Lamanda Park. For a while I needed five cars to take care of the business, but now I cannot make a living at it."

JITNEY CONTROL REFUSED IN INDIANA

Commission Decides It Has No Jurisdiction Under Utility Act—Railway in Kokomo Establishes Bus Lines with Schedules and Transfers on Non-Car Streets

The Public Service Commission of Indiana entered an order on July 24 dismissing the petition of the Terre Haute, Indianapolis & Eastern Traction Company, which sought to bring all jitney buses in the State under the control of the commission, as noted in the ELECTRIC RAILWAY JOURNAL of July 17. The commission stated that it had no jurisdiction under the public utility law of 1913.

A hearing was held on July 22, at which officials of the principal street and interurban railways of Indiana appeared before the commission and joined in the petition of the Terre Haute, Indianapolis & Eastern Traction Company. John T. Beasley, attorney, appeared for that company and reviewed the petition and the progress of jitney operations up to this time. Mr. Beasley explained that the petitioners did not contemplate in any way that the jitneys should be wiped out as a competitive factor in the transportation problem, but that regulation on the same basis as the electric roads was all that was desired. He said that if in the development and advancement of this age, new and better methods of transportation are found, the commission should not be called upon to stand between one competing system and another, but it is the province of the State that the competition should be fair.

Mr. Beasley stated that while the Indiana utilities law specifies certain classes of utilities, among which the jitneys do not appear, the law refers frequently to "every public utility," "all public utilities" and "any public utility," and therefore, he argued, it was undoubtedly the intent of the legislature that the commission should have power over such a competitive agent of the traction companies as the jitney buses. Mr. Beasley quoted from decisions of other states to prove his contention that where such an act as the Indiana public utility commission law specifically refers to certain types of utilities it does not exclude from its provisions thereby others of a similar type. Commissioner

Clark asked Mr. Beasley what the commission might do in the premises, assuming that it had jurisdiction. Mr. Beasley said that it might issue an order citing all jitney bus owners to appear by counsel before the commission to formulate some method of licensing the jitneys. Commissioner Clark then expressed his opinion that the electric railway companies had the right to go into court asking restraining orders against the competing jitneys, thus getting the question judicially settled.

Ferdinand Winter, general counsel for the Terre Haute, Indianapolis & Eastern Traction Company, argued that the State has deemed it wise to prevent utilities from earning more than a fair return on an investment, and because of this the State should protect the utility from unfair competition of jitney buses, so that it might earn this amount.

After the decision the Indiana Railways & Light Company, operating the local lines in Kokomo, Ind., announced that it would establish two lines of jitney buses which will operate in portions of the city not now served by street cars. A regular schedule will be maintained and transfers will be given to the street cars, so that passengers may go to any part of the city for a 5-cent fare.

MOTOR BUSES FOR BALTIMORE

W. A. House, president United Railways & Electric Company, Baltimore, Md., stated on July 22 that his company was interested in the Baltimore Transit Company, which will place a number of motor buses in service on the streets of Baltimore. Mr. House said that the railway's interest in the establishment of this service is due to its desire to see a bona-fide effort made to ascertain whether or not that method of transportation is a desirable supplement to the present methods, and that its future action would depend on this demonstration. He added: "It has been shown by the experience with that type of vehicle elsewhere that, as now operated, they cannot be made to pay, and except where operated on a 10-cent fare they have gradually disappeared from the transportation field. It has not yet been demonstrated, however, whether or not they can be operated successfully as supplementary to street railway traffic. We are extremely doubtful as to whether they can, but we shall find out as a result of this experiment."

The Baltimore *Sun* states that the Baltimore Transit Company has an authorized capital of $100,000 and that it is having more than a score of buses made for it by The J. G. Brill Company, Philadelphia. William H. McKee, Philadelphia, is now in Baltimore as the general manager of Baltimore Transit Company.

JITNEY ORDINANCES RECENTLY PASSED

Wichita, Melrose, Ashtabula, San Diego, Leavenworth and Bridgeport Assume Regulation of Jitneys—Supplementary Ordinance in Dallas for "Rent" Cars

The city of Wichita, Kan., on July 15 passed a jitney ordinance to take effect after Aug. 1. The feature of this ordinance is the inducement offered to keep jitneys off streets occupied by car lines. No one operating a jitney may solicit or receive passengers on car streets (though they may travel on such streets) unless the owner shall pay an additional license fee of $300 a year for five-passenger vehicles, $350 a year for vehicles carrying from five to ten passengers and $400 a year for vehicles carrying more than ten passengers. All other streets may be traversed at will, provided the operators designate the route to be traversed and publish in some public manner the time of departure from the designated terminal corner for all jitneys. The regular city license for jitneys payable annually is $25 for a five-passenger car, $35 for a ten-passenger car and $50 for more than a ten-passenger car. No jitney will be allowed to carry more passengers than the license designates, and only one passenger may ride on the front seat.

Melrose, Mass., has adopted a jitney ordinance, the feature of which is that under no consideration shall the seating capacity of the car as planned by the maker be overtaxed. In applying for a license the applicant is required to show proof of the seating capacity of his automobile as given by the maker, pay a fee of $1 for a license and file an indemnity bond of $5,000.

In an effort to escape compliance with the jitney ordinance of Dallas, Tex., which was enforced on July 19, providing for a license fee of $75, members of the jitney union made preparations to take down their street signs and operate their cars as before, but under the guise of rent automobiles at the license of $10 provided for rent cars. This evasion was thwarted by the city officials through the creation of another ordinance which prohibits the solicitation of patronage by operators of automobiles for hire other than a motor bus as "motor bus" is defined in the jitney ordinance. The new ordinance stipulates that an operator of an automobile for hire shall be considered as soliciting patronage if he shall announce by voice, sign, writing, color scheme, symbol or advertisement, other than the license number plate, that such automobile is used for transporting passengers for hire. This emergency ordinance compelled compliance with the jitney ordinance, and the day following its enforcement there was no attempt to operate. Efforts to have this ordinance declared unconstitutional failed.

The jitney ordinance in Ashtabula, Ohio, was declared valid on July 12 by Common Pleas Judge A. C. Reynolds. Every point on which the ordinance was attacked by jitney operators was decided in favor of the city. This decision ends a long struggle in Ashtabula. The first ordinance passed by the Council was declared invalid by an acting police judge. On June 7 another ordinance was presented in Council which passed under suspension of rules and became effective on June 15. This also was declared invalid by the police judge, after which the jitney drivers had full sway until this decision by Judge Reynolds. The court decided that the requiring of a license fee of $25 was a proper exercise of the police power and the license itself was neither excessive nor unreasonable. The bonds of $3,000 for less than nine-passenger cars and $5,000 for nine-passenger cars were declared to be within the authority of the city in protecting the public and injured persons. The court held that the operation of the jitney is itself a legitimate business, but that unless it was controlled irresponsible persons would engage in it to the danger of passengers and pedestrians.

After one ordinance had been declared unconstitutional as the result of injunctions secured by the jitney drivers, Mayor Tapps of San Diego, Cal., on July 2 approved a second ordinance passed by the Common Council. This ordinance provides for an application for an auto-bus permit by the owners or lessees of cars, the application to state the routes to be followed, the fare, the schedules, the transfer points, the type of vehicle, the seating capacity and the like. The car owner or lessee must file a bond or insurance policy of $10,000 to cover accident and damage settlements and pay a license fee of $10 for each jitney seating five or less passengers, $15 for one seating more than five and less than eight passengers, $25 for one seating more than seven and less than sixteen passengers, and $40 for one seating more than sixteen passengers. Jitney operators must submit to an examination and pay a license fee of $1. No licenses to operate will be granted to any persons under eighteen years of age. The jitneys are prohibited from running off the prescribed routes, cutting schedules, raising the rates of fare and refusing firemen and police free transportation. Violations are punishable by a fine of not more than $100 or imprisonment for not more than three months, or both.

The Leavenworth (Kan.) city commissioners on July 20 passed a jitney ordinance requiring a license of $100 a year and a bond of $10,000. The jitneys must run on a regular schedule and a fixed route.

An ordinance for the regulation and licensing of jitneys went into effect in Bridgeport, Conn., on July 1. This ordinance provides that each jitney shall be licensed by the superintendent of police, the fee being $10 for the original license and $10 for each renewal for vehicles and 50 cents for drivers. The superintendent of police is empowered to require a demonstration by each applicant for a driver's license. No riding is allowed on the steps, hoods or doors of the jitneys and not more than three passengers above the actual seating capacity may be carried at any time. A violation of any provision of the ordinance is punishable by a fine of not more than $100. It is provided that the ordinance does not apply to any motor vehicle whose minimum charge is more than 10 cents.

JITNEY JOTTINGS

Jitneys in Kansas City Meet Rebuff—Memphis Railway Asks Injunction—Bristol Company Buys Buses for Jitney Service

The jitney situation in Kansas City, Mo., became acute last week, when the White Star line of buses raised its fare to 10 cents and discovered that the people would not pay this amount. They maintained this rate for a few days and then suddenly restored the 5-cent fare. After the failure of the Kansas City Jitney Transportation Company, noted in the ELECTRIC RAILWAY JOURNAL of July 24, plans for a coalition of jitney forces, abandoned several weeks ago because of lack of support, were taken up and met with hearty response. The Rapid Transit line got 100 adherents in a few days. This company had already leased a lot 50 ft. x 115 ft., at 1318 Walnut Street, erected a tent and arranged gasoline stations and small facilities for parking cars. It is now the plan to erect a building, with docks extending the long way of the lot, the cars to pass along one dock inward and out by way of the other. The ingoing and outgoing cars will be separated by a low curbing, the docks being on the outside of the runways. There will be plenty of seats on the docks, and outside the north and south walls will be concessions.

The Memphis (Tenn.) Street Railway on July 17 filed a bill in chancery to enjoin every jitney owner now operating in Memphis. It is asserted that the jitney drivers are operating without having given bonds as required by the recent Legislative act, without license, permit or franchise, and are using the streets without lawful authority, control or regulation of any kind. Jitney corporations and owners to the number of 316 are made defendants. The alleged infringement on the franchise rights of the railway is said to be causing the company a daily loss of $750 to $1,000.

The United States Circuit Court at Memphis on July 17 denied an injunction sought to void on constitutional grounds the Tennessee statute requiring jitney operators to furnish an indemnifying bond. It was held that the Tennessee act was not violative of the fourteenth amendment of the federal constitution. The opinion is contrary to the decision of Judge Pittman of the State Court, whose ruling was that the act was unconstitutional on account of being class legislation. An appeal from Judge Pittman's decision is pending. Aside from the moral effect on the appealed case, the federal decision simply confines the case to State litigation.

The Bristol (Tenn.) Traction Company has put a 1915 Buick jitney bus in service to supplement its railway lines and is reported to have purchased other automobiles to enter the service. Half a dozen cars have been bought and put into service by the local jitney company, which is composed of business men. The routes have been definitely laid out and the cars are operated on a schedule.

Claiming that jitney competition has seriously affected its business, the Charleston (W. Va.) Interurban Railroad has asked the Public Service Commission to allow it to discontinue traffic on two of its lines, one of them an interurban.

Judge Robert G. Street of the Fifty-sixth District Court at Galveston, Tex., on July 14 denied the petition of the Texas City-Galveston automobile line for an injunction to restrain the city officials of Galveston from enforcing a regulatory ordinance requiring bus licenses and an indemnity bond on each bus to the sum of $10,000. Judge Street held that in the enforcement of the ordinance there was no violation of any vested rights of the petitioners for using the streets and alleys of Galveston, and that they were subject to the ordinance notwithstanding the fact that they did not operate between points within the city.

The Philadelphia Jitney Association on July 22 unanimously voted against the six-for-a-quarter strip tickets which were recently adopted by the Auto Service Association, the South Philadelphia Jitney Owners' Association and the West Philadelphia Jitney Association, as noted in the ELECTRIC RAILWAY JOURNAL of July 24. As a result of this decision the tickets will be good on only about two-thirds of the jitney lines of Philadelphia. The Philadelphia Jitney Association also passed a resolution that no jitney driver could belong to both it and the Auto Service Association, which will cause 300 men to desert one of them.

The Des Moines ordinance for the regulation of jitney buses was declared valid this week in the District Court. The Court holds that the city has a right to regulate the operation of jitneys and to require an indemnity bond as the ordinance provides. The only portions of the ordinance held invalid are the sections requiring that jitneys take on or discharge passengers within 2 ft. of the curb and that they be halted behind street cars or other jitneys taking on or discharging passengers. The section of the present ordinance requiring bonds is also faulty, because it does not insure a proper bond. This defect of the ordinance will be remedied by the city at once. Recent investigations show that the number of jitneys being operated in the city has fallen below thirty.

I. C. C. DECIDES TRAFFIC CASE

Commission Specifies Basis of Haul Division and Prorating of Joint Rates for Insull Lines Between Louisville and Indianapolis

After a long controversy between the Board of Trade of Louisville, Ky., and the three Insull lines which together make up the route from Louisville to Indianapolis, the Interstate Commerce Commission on July 23 handed down an order apportioning between the three roads the rates to be charged on shipments of freight north from Louisville. The contentions also involved the matter of adequate terminal facilities in Louisville, and the commission directed in favor of the Board of Trade.

The commission's order provides that the through rate between Louisville and Indianapolis shall be divided into three parts, the haul being from Louisville to Seymour, from Seymour to Sellersburg and from Sellersburg to Indianapolis. As between these parts, the joint rates shall be prorated on a mileage basis, with a minimum division of 20 per cent to the Indiana Public Service Company, a like minimum division to the Indianapolis & Louisville Traction Company, and a like minimum division in the aggregate to the Louisville & Southern Indiana Traction Company and the Louisville & Northern Railway & Lighting Company for their services south of Sellersburg. The last-named two lines, however, shall have an arbitrary allowance before prorating, on account of Ohio River bridge conditions and terminal conditions, of 1 cent per 100 lb. on less-than-carload shipments, and one-half of 1 cent per 100 lb. on carload traffic, this arbitrary allowance to be included in the minimum 20 per cent division and not to be added to it. By the ruling the basis of divisions and minima shall also govern the apportionment of joint rates applying between Louisville and points on the Indianapolis & Louisville Traction Company line.

This finding means a great deal to the Louisville shippers and is expected to result in an increased volume of freight to the railway companies. Heretofore Louisville shippers have been unable to bill shipments through north of Seymour, although shippers in and north of Indianapolis were able to bill through to Louisville and electric railway points beyond. Traffic by electric railway north of Seymour meant many changes and many bills for the three lines were unable to agree on a division of the rates. As a result the traffic was virtually little or nothing. The basis of division is now specified, and the Louisville Board of Trade will take up with lines north of Indianapolis the matter of through rates from Louisville, heretofore made impossible by reason of the deadlock south. No difficulties are expected in working out these schedules, and through rates would open up a wide and rich territory to Louisville, reaching from Chicago through Toledo, Detroit, around to Cincinnati.

Interurban and Steam Lines Running Excursions.—The Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., is running popular excursions to St. Louis in connection with the Toledo, St. Louis & Western (Clover Leaf) Railroad. The business is handled via Bluffton, Ind.

Holding Cars for Transfer Passengers.—The cars of the Louisville (Ky.) Railway are being held at intersecting points until it is certain that there are no passengers wishing to transfer from cars on the cross lines. There was some disposition at first to complain about delays through

such waiting, but this kind of service now has the full support of the people who ride on the cars. Visitors to the city write letters to the local papers expressing their approval of this practice and speaking of the distinction it gives the service. It has not been found that waits of this kind slow up the traffic appreciably.

June Accidents in New York City.—The engineers of the Public Service Commission for the First District of New York have completed the tabulation and classification of all accidents reported by railroad and street railway companies in the district for June. They show a total of twenty-three persons killed, which is exactly the number killed in June of last year. Of these fatalities eight occurred on the surface lines, eight on subway and elevated lines, six on railroad trunk lines, and one on railroad terminal lines. The total number of accidents decreased from 6466 in June, 1914, to 6148 in June, 1915.

Joplin & Pittsburgh Line to Develop Carload Freight.—The appointment of a traffic manager, J. D. Cornell, by the Joplin & Pittsburgh Railway, noted in the issue of July 24, prefaces active efforts for carload business. Heretofore the line has done considerable freight business, but mostly in broken carloads, handled by the baggage or freight cars of the company. Through rates and divisions are being arranged on all commodities from Kansas City, the Missouri River and defined territory to all points on the Joplin & Pittsburgh Railway. It is expected that preliminary details, such as agreements with steam roads, publication of rates and approval by the commission, will be completed so that the extended business can begin to flow by Sept. 1.

Petition for Extension of Fare Limits Refused.—The Massachusetts Public Service Commission has refused to grant a petition of the Selectmen of Rockland for the extension of transfer privileges on the Bay State Street Railway within the town. The general grant noted in the ELECTRIC RAILWAY JOURNAL of July 24 had reference to the consent of the company to extend the privileges of an existing 7-cent workman's ticket, good at certain hours only, between Rockland and Brockton to all parts of Brockton. This offer was made by the company pending a decision upon the application which it expects to make for a general revision of fares as a result of the recent arbitration award. In refusing to grant a general free transfer in Rockland, the commission pointed out that passengers boarding a car in any part of Rockland would be able to ride to Brockton or vice versa for 10 cents.

An Investigating Committee Satisfied.—Representatives of the transportation committee of the Louisville Commercial Club recently called on Walter Foreman, superintendent of the Louisville & Northern Railway & Lighting Company and the New Albany (Ind.) city lines, to take up a protest made at a recent club meeting about poor freight and express service between New Albany and Louisville. Mr. Foreman satisfied the committee that other circumstances than the delivery system were responsible for delays complained of, and incidentally disclosed the elaborate preparations that had been made to give Louisville merchants a first-class service with the towns across the river. The freight cars of the Louisville & Northern line and those of the Louisville & Southern Indiana Traction Company operate as frequently as the volume of traffic justifies and this service would be increased if the demand for it developed sufficiently. It was possible, in fact unavoidable, Mr. Foreman stated, that bulky freight shipments which were not delivered until after 5 p. m. would not reach the other side until the next morning, but freight in packages of less than 100 lb. was normally delivered in New Albany in forty-five minutes, and similarly in Jeffersonville, while equally quick service is given in Seymour, Columbus, etc., on small freight from Louisville. The cars for a large part of the day are run on a fifteen-minute schedule, while except at night the service is never slower than half hourly. The motor trucks of the company make collections and deliveries in the business section of Louisville, from the river to Broadway and from Shelby to Fifteenth Street; and collections and deliveries are made to all points of the Indiana cities across the Ohio River. After hearing these facts, the committee recommended a larger use of the service available.

Personal Mention

Mr. T. J. Collins has been appointed assistant superintendent of the Eastern Pennsylvania Railways, Pottsville, Pa.

Mr. C. D. Willoughby has been elected vice-president of the Mobile Light & Railroad Company, Mobile, Ala., to succeed Mr. J. H. Whiting.

Mr. E. S. Gillette, formerly assistant engineer of the Aurora, Elgin & Chicago Railroad, Wheaton, Ill., has been appointed electrical engineer to take up part of the duties made vacant by the resignation of Mr. E. F. Gould, noted elsewhere in this column. Mr. Gillette will have charge of the shop, power house, substation and line departments.

Mr. J. Dunhill, secretary of the Trinidad Electric Transmission, Railway & Gas Company, Trinidad, Col., has been elected treasurer of the company to succeed Mr. L. C. Gerry. Mr. J. B. Marsh has been elected secretary of the company to succeed Mr. Dunhill.

Mr. E. R. Peacock has been appointed president of the Barcelona Traction, Light & Power Company, Ltd., Barcelona, Spain, to succeed the late Mr. F. S. Pearson. Mr. Peacock will have charge of the financial arrangements of the company.

Mr. C. F. W. Wetterer of Stone & Webster, with headquarters at Boston, is now assisting Mr. C. F. Wallace, now at Dallas, Tex., in charge of the Stone & Webster interests there. Mr. Wetterer was formerly secretary to Mr. M. H. Phinney of Stone & Webster.

Mr. J. J. Callahan, formerly superintendent Montreal & Southern Counties Railway, Montreal, Que., was on July 15 named operating manager of the London & Port Stanley Railway, London, Ont., which is now being run by hydropower by the city of London.

Mr. H. S. Cooper, who has been the energetic secretary of the Southwestern Electrical & Gas Association for the last three years, has opened an office as consulting and advisory engineer at Dallas, Tex. This makes no change in his office as secretary of the association. In his new work Mr. Cooper will specialize on the construction, operation, and maintenance of electric railways, lighting, gas, and waterworks properties, not only in engineering cases but in matters of public policy. He has been very actively connected with work of this kind for the last twenty years or more, first in Schenectady, N. Y., then in Ithaca, N. Y., and later in Galveston, and he has been conspicuously successful in rehabilitating poorly-paying properties and in putting them on a sound financial basis.

Mr. E. F. Gould has resigned his position as assistant general manager and mechanical and electrical engineer of the Aurora, Elgin & Chicago Railroad, Wheaton, Ill., to become consulting engineer in the Cleveland office to act in a supervisory capacity over all the properties in which Mandelbaum, Wolf & Lang are interested. Mr. Gould has been with the Aurora, Elgin & Chicago Railroad since 1903, first as a mechanical and electrical engineer and later as assistant general manager and engineer. He designed and built all additions and improvements to plant and equipment and paid special attention to power economies. Prior to 1903 he spent four years in the railway engineering department of the General Electric Company at Schenectady. For the last few years Mr. Gould has been consulting engineer for the Western Ohio Railroad, Lima, Ohio, one of the properties owned by Mandelbaum, Wolf & Lang.

OBITUARY

Samuel E. Vincent, author of the Connecticut public utilities commission act, died at his residence in Bridgeport, Conn., on July 19.

J. Frank Chapman, who was general manager Thousand Islands Railway and Oshawa (Ont.) Railway, died at his home in Gananoque, Ont., on July 19 at the age of fifty-two. When seventeen years of age he entered the employ of the Thousand Islands Railway as junior clerk, from which position he rose to be chief executive. He was president of the Canadian Freight Association for one year.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Corpus Christi Traction Company, Corpus Christi, Tex.—Incorporated in Texas to construct an interurban railway in and out of Corpus Christi north, west and south. Capital stock, $100,000. Incorporators: J. S. Caswell, San Diego; J. R. Hopkins, W. G. Blake, Orlan P. Metcalf, Gordon Boone and W. E. Pope, all of Corpus Christi, and Arthur McEvoy, New York City. [July 17, '15.]

FRANCHISES

***Los Angeles, Cal.**—P. D. Cornelius has received a twenty-one-year franchise from the Council to construct an electric railway on Brooklyn Avenue, Evergreen Avenue and Wabash Avenue, Los Angeles.

Los Angeles, Cal.—The Pacific Electric Railway has received a franchise from the Council to construct an extension of its lines across the Shoe String Strip.

San José, Cal.—The Council of San José has passed a resolution to grant a franchise for the construction of a line on Alum Rock Avenue requested by the San José Railroads. Bids for the franchise will be received by the Board of Supervising Engineers until Sept. 7, 1915.

***Clearwater, Fla.**—E. W. Parker, Tampa, and associates have received a franchise to construct an electric railway in Clearwater and vicinity.

***Baltimore, Md.**—The Idlewylde Park Railway has received a franchise from the Council to lay tracks on Regester Avenue from the York Road to Idlewylde Park. This railway will connect with the tracks of the Towson and Catonsville division of the United Railways & Electric Company.

Springfield, Mass.—The Springfield Street Railway has received a franchise from the Council to construct a railway from East Springfield to Chicopee.

Buffalo, N. Y.—The Council of Buffalo has adopted a report granting a franchise to the International Railway to lay a special track on Michigan Avenue and Ohio Street, subject to the consent of the Lackawanna Railroad.

Utica, N. Y.—The New York State Railways will ask the Council for a franchise to extend its Elm Street line eastward on James Street, Utica.

Wilkes-Barre, Pa.—The Wilkes-Barre Railway has received a franchise from the Council to lay tracks on East North Street between North Main Street and North Pennsylvania Avenue. This track will be used by the Parsons, East End and Miner's Mills cars for temporary service during the construction of a new sewer on North Pennsylvania Avenue.

TRACK AND ROADWAY

Columbus, Ark.—Work has been resumed on the proposed electric railway between Columbus and Washington, Ark., after having been suspended last fall on account of financial conditions. It is expected that the roadbed will be ready for the ties and rails inside of six weeks. Rufus S. Stout, Pine Bluff, is interested. [May 1, '15.]

Connecticut Company, New Haven, Conn.—This company has agreed to pay $1,250 toward the construction of a new bridge over Sumner Creek, Hartford, and work will be begun at once. The bridge will be 65 ft. long and 32 ft. wide, with a roadway of 26 ft. and 6 ft. for pedestrians. A temporary bridge will be constructed for use while the new bridge is being built.

Washington Railway & Electric Company, Washington, D. C.—Work has been begun by this company improving its tracks in Anacostia and placing its power underground.

Clearwater, Fla.—Work will soon be begun on the proposed electric line from Brooksville to St. Petersburg, via Clearwater. Construction will be begun at Brooksville and will extend southward. It is expected that the line will be completed as far as Clearwater by Nov. 1. James Murphy, St. Petersburg, is interested. [Nov. 7, '14.]

Lewiston-Clarkston Transit Company, Lewiston, Idaho.—Announcement has been made that this company plans to extend its lines in Lewiston about 1 mile and its lines in Clarkston about 1 mile at an estimated cost of from $75,000 to $100,000. Preliminary surveys have been made.

La Salle County Electric Railroad, Chicago, Ill.—Plans for the construction of this company's line have been submitted to the Public Utilities Commission of Illinois. The contemplated road will connect Ottawa and Mendota. [July 17, '15.]

***Peoria, Ill.**—Peoria financiers are interested in a proposition to construct an electric railway from Peoria to Galesburg. The route will probably be via Peoria and Farmington, to connect with the Illinois Central Electric Railway extending south from Galesburg into Fulton County.

Peoria (Ill.) Railway.—Material has been received and work will be begun at once by this company relaying its tracks on Second Avenue from Franklin Street to State Street, Peoria.

Tri-City Railway Company of Illinois, Rock Island, Ill.—This company expects to have its new Fourth Street line in operation within the next thirty days. The rails being used are of the heaviest type.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—This company is considering the construction of a line to Spencer Park, Logansport.

Indianapolis Traction & Terminal Company, Indianapolis, Ind.—This company will lay an additional track on Indiana Avenue, Indianapolis, from West Street to Blake Street.

Lafayette & Northwestern Railway, Lafayette, Ind.—The people of Rensselaer, Ind., voted down a proposition to give a 2 per cent subsidy, amounting to $60,000, for the construction of this company's line through Rensselaer. [April 3, '15.]

Louisville & Southern Indiana Traction Company, New Albany, Ind.—In connection with the improvement of Market Street from the Chicago, Indianapolis & Louisville Railway to Vincennes Street this company will replace its T-rails with girder rails.

Fort Dodge, Des Moines & Southern Railroad, Boone, Iowa.—Homer Loring, president of this company, announces his relinquishment of stock control of the Crooked Creek Railroad between Lehigh and Webster City. He says he has given up the idea of electrifying the line, although he has not abandoned the project for an electric line from Fort Dodge to Webster City. The contract for new $70,000 terminal buildings at Fort Dodge has been awarded and work is now in progress. Work has been begun on a new $50,000 warehouse at Fort Dodge.

Ottumwa Railway & Light Company, Ottumwa, Iowa.—A petition will soon be presented to this company by the residents of Ottumwa for the extension of its Court Hill line north about 1½ miles.

Hutchinson (Kan.) Interurban Railway.—Plans are being made by this company to use steel ties in the construction of its track on South Main Street and Second Avenue East. The base of the right-of-way under the pavement will be of concrete. Under each rail, extending lengthwise of the street, will be a section of reinforced concrete on which the steel ties will rest.

Lowell & Fitchburg Street Railway, Ayer, Mass.—This company has asked the Public Service Commission of Boston for its approval of the extension of its tracks on Main Street and West Main Street, Ayer, across the Boston & Maine Railroad tracks to connect with the Ayer terminus of the Shirley-Ayer line of the Fitchburg & Leominster Street Railway.

Bay State Street Railway, Boston, Mass.—This company has completed the work of laying new double track on its line on Lakeview Avenue, Dracut.

Boston (Mass.) Elevated Railway.—Work has been begun by this company laying new tracks on Washington Street, Brookline.

Worcester (Mass.) Consolidated Street Railway.—This company has completed the work of relocating its tracks in Wood Square, Marlboro.

Detroit (Mich.) United Railway.—Work will be begun at once by this company on the construction of an extension into the Fourth Ward. The line will connect the west side with other car lines in the city.

Fallon (Nev.) Electric Railway.—Work has been resumed by this company on the construction of its line from Fallon to Sand Springs, 30 miles. The roadbed is completed as far as the heavy grading, cuts and fills are concerned, and work at present will be confined to trimming up the grade to get ready for the laying of ties and tracks. It is expected that track-laying will be begun within the next sixty days. Mayor E. S. Berney and Dr. C. A. Hascall are interested. [Dec. 19, '14.]

***Landing, N. J.**—Decision to build a new electric line from Landing to Lake Hopatcong and thence through Fort Morris to Netcong was reached on July 20 at a meeting in Pittsburgh of officials of the Morris County Traction Company. While this new railroad will be virtually under the management of the Morris County Traction Company it was decided for financial purposes to form a separate company, the name of which has not been selected. It is proposed to pay 5 per cent of the gross income to the municipalities through which the new line will pass. Roxbury Township has already granted the franchise from Landing through Port Morris, but the question has not yet come up before the Netcong officials.

***Salem, N. J.**—Plans are being considered to construct an electric railway from Salem to Pennsgrove. Among those interested are Arthur B. Smith, Harry G. Hart, Isaac C. Smashey, James S. Wheeler and Wesley F. Sinnickson.

New York, N. Y.—Bids were opened on July 27 by the Public Service Commission of the First District of New York for the construction of Section 3 of Routes No. 4 and 36. This section begins at Thirty-eighth Street, New York, and runs north under Broadway to Forty-second Street, where it crosses under the line of the existing subway and continues north through Seventh Avenue to Fifty-first Street. The lowest bid was that of Holbrook, Cabot & Rollins Corporation for $3,741,000. Bids were also opened for the construction of Section 3 of Route No. 12, which runs under Eastern Parkway, Brooklyn, from Nostrand Avenue to Buffalo Avenue. The lowest bid was that of Rodgers & Hagerty, Inc., for $2,170,000. The Broadway subway is to be operated by the New York Consolidated Railway under contract between the city and the New York Municipal Railway Corporation. The Eastern Parkway subway will be operated by the Interborough Rapid Transit Company as an extension of the existing subway. Bids were also opened for the supply of 2200 tons to 3000 tons of manganese rails to be used on the new subway and elevated lines to be owned by the city, for which the lowest bid was that of Manganese Steel Rail Company, $263,591.

Niagara River & Eastern Railway, Niagara Falls, N. Y.—Briefs were filed by this company on July 20 with the Public Service Commission for the Second District of New York, supporting its petition for permission to build a double track fast freight and passenger line from Lockport to Niagara Falls to connect with the Buffalo, Lockport & Rochester Railway and the International Railway. Connected with this plan is the proposition to double track the Buffalo, Lockport & Rochester Railway. [April 10, '15.]

Goldsboro Electric Railway, Goldsboro, N. C.—This company reports that it expects to build 1 mile of new track in Goldsboro.

Cleveland (Ohio) Railway.—Peter Witt, street railway commissioner of Cleveland, stated on July 21 that the Buckeye Road line will be extended from East 116th Street to East 130th Street and the Woodland Avenue line from East 122d Street to East 130th Street. Work will be completed by Dec. 1.

Cleveland, Akron & Canton Terminal Railway, Cleveland, Ohio.—Engineers will begin work within the next few days along the route of this company's proposed subway under East Fifty-fifth Street, preparing plans, specifications, and estimates covering the construction of the subway, freight stations, docks, and water front development. The Foundation Company of New York and the Osborne Engineering Company have received the contract. O. C. Barber, Barberton, president. [July 24, '15.]

Lehigh Valley Transit Company, Allentown, Pa.—Plans are being made by this company to lay a second track along Broad Street, West Bethlehem, near Twelfth Avenue.

Schuylkill Electric Railway, Pottsville, Pa.—The contract for the grading and laying of track on this company's line over Broad Mountain has been awarded to the Trexler Contracting Company, Reading. The railway will connect Pottsville, Frackville, and Shenandoah, and will form a complete line between Pottsville and Shamokin. The rails to be used will be of the heaviest type.

***Alexandria, Tenn.**—The voters of Alexandria and the rest of DeKalb County will vote on Aug. 12 on a $150,000 bond issue as its contribution to an electric railway that is projected to run through DeKalb County and Wilson County. The Nashville, Chattanooga & St. Louis Railway plans to electrify its road from Nashville to Lebanon, to connect with the extension which is planned to run from Lebanon via Watertown, Alexandria, Liberty, and Dowelltown to Smithville.

Northern Texas Traction Company, Fort Worth, Tex.—This company plans to extend its Summit Avenue line for more than half a mile beyond the present terminus, Willing Street and Folsom Avenue. The line will extend west on Folsom Avenue to Gordon Street and south on Gordon Street to the old belt line tracks. About 2500 ft. of the extension will be beyond the city limits.

Wheeling (W. Va.) Traction Company.—This company is placing new ties and rails on Eoff Street, Wheeling, between Twenty-seventh Street and Twenty-ninth Street, and laying new brick between the tracks.

Waupaca Electric Light & Railway Company, Waupaca, Wis.—A report from this company states that it expects to install a small signal equipment some time before fall.

SHOPS AND BUILDINGS

Illinois Traction System, Peoria, Ill.—The Public Utilities Commission of Illinois has approved the plans for a joint station to be built by this company and the Chicago & Eastern Illinois Railroad at Glover, Ill.

Arkansas Valley Interurban Railway, Wichita, Kan.—This company has purchased the property opposite the railway junction at Burrton for its new interurban station.

Electric Short Line, Minneapolis, Minn.—Bids will be opened shortly by this company for the construction of a new passenger station at Seventh Street, Holden Street, and Third Avenue N., Minneapolis.

New York State Railways, Rochester, N. Y.—Plans have been completed and work will soon be begun by this company on the construction of a new terminal at Glen Haven.

Goldsboro Electric Railway, Goldsboro, N. C.—A report from this company states that it has awarded a contract to Glisson & Sons for the construction of a new carhouse in Goldsboro.

Oregon Electric Railway, Portland, Ore.—Among the improvements contemplated by this company is the construction of an extension to its freight sheds in Eugene which will almost double their capacity, and a warehouse 50 ft. x 100 ft. at Harrisburg.

POWER HOUSES AND SUBSTATIONS

Manchester Traction, Light & Power Company, Manchester, N. H.—J. H. Mendell Company has begun work on the construction of this company's Brook Street substation and on the auxiliary steam power plant at Kelley's Falls. Construction will soon be begun on its substation at Garvin's Falls. The Brook Street substation will be 145 ft. x 100 ft. and 64 ft. high. The generators will have a capacity of about 3500 kw. The Garvin's Falls substation will be 42 ft. x 70 ft. The Kelley's Falls plant will be 144 ft. x 44 ft. and 75 ft. high, and will be added to the recently completed substation, forming an L. This plant will generate 10,000 hp. All the buildings will be of brick and cement construction. It is expected that the cost of these improvements will be about $300,000.

Union Light, Heat & Power Company, Fargo, N. D.—This company has placed an order through H. M. Byllesby, Chicago, for two 1875-kva., 2300-volt, 3600 r.p.m. turbo-generator units. The apparatus has been ordered from the Westinghouse Electric & Manufacturing Company.

Manufactures and Supplies

ROLLING STOCK

Humboldt Transit Company, Eureka, Cal., is remodeling its cars for pay-as-you-enter service.

San Francisco Municipal Railway, San Francisco, Cal., has received sealed bids for furnishing and delivering a work car.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., is considering the purchase of some new observation cars for interurban use.

Corpus Christi & Ward's Island Railway, Corpus Christi, Tex., a new line which is under construction between Corpus Christi and Ward's Island, is contemplating storage battery service and is figuring on a 25-ton storage battery locomotive to handle the movement of truck farming products in that section, the locomotive to be capable of handling 100,000 lb. in weight at a speed of 15 m.p.h. on level track.

Richmond & City Point Transportation Company, Richmond, Va., J. C. Robertson, has made arrangements with the Tidewater & Western Railroad for passenger operation over the latter's line in connection with the Virginia Railway, Light & Power Company to operate storage battery service to Bermuda Hundreds and thence by ferry to Dupont City, Va., the population of which latter city has increased from 18 inhabitants to 17,000 since the Dupont powder plant was built there.

Public Service Railway, Newark, N. J., has begun work in its shops on the construction of a closed car for city service. The length over bumpers will be 50 ft. 10 in., or 5 ft. longer than the standard cars now in service. Body length will be 36 ft. 6 in. Other details will be as follows: steel underframe, steel sides up to belt rail, tee-iron carlins, no bulkheads, longitudinal seats, compromise-type roof, with Agasote roofing and no inside lining, Standard Steel trucks, Westinghouse motors and Westinghouse HL control.

Maryland & Pennsylvania Railroad, Baltimore, Md., a steam road, has leased a storage battery car of the Railway Storage Battery Car Company, New York, N. Y., for trial operation under its regular passenger 75-minute schedule between Belair and Baltimore, 26.3 miles. The car will make three round trips per day, hauling a 30-ton trailer. The average grade on the line is 2.19 per cent, the maximum 5 per cent; there are also a great number of curves. If this car meets the requirements of service this railroad contemplates storage battery operation for the entire passenger service between Belair and Baltimore by equipping the line with five more cars.

TRADE NOTES

Curtain Supply Company, Chicago, Ill., has received orders to equip with its curtain fixtures and rollers the new cars recently ordered by the Corpus Christi & Interurban Railway, New York & Queens County Railway and Norton & Taunton Railway.

Esterline Company, Indianapolis, Ind., has received orders for "Golden Glow" headlights for the following electric railways: Metropolitan Street Railway, Kansas City, Mo., twenty SM-95 headlights; Beaumont (Tex.) Traction Company, fourteen SM-95 headlights; Binghamton (N. Y.) Railway, fourteen SM-95 headlights; Georgia Railway & Power Company, twenty-four SR-95 headlights, and New York & Queens County Railway, twelve SE-95 headlights.

Block Folding Step Company, Louisville, Ky., which proposes to manufacture and market a folding step for street cars and other vehicles, has been incorporated in Louisville with $5,000 capital stock. The authorized bonded indebtedness is $20,000. Incorporators are Rollie A. Jackson, Owensboro, Ky., and William H. Bartlett and William A. Rosenfield, Louisville. Morton Yonts of O'Doherty & Yonts, 906 Inter-Southern Building, is also interested. Plans of the company are indefinite as yet.

Electric Materials Company, North East, Pa., has been formed for the purpose of manufacturing electric machinery and repair parts, such as commutators, trolley wheels, line material, copper, bronze and brass castings, and drop forgings in copper and steel. The plant at North East is of brick and steel construction and occupies 15,000 sq. ft. of floor space. The officers of the company are: President, G. E. Pierce; vice-president, F. B. Moorhead; treasurer, O. C. Hirtzel; secretary, N. P. Fuller. A sketch of Mr. Hirtzel's business career was published last week. This item is a correction of one in last week's issue in which an error was made in the name of the company.

Lord Manufacturing Company, New York, N. Y., announces the resignation of E. A. Lightner as manager to become president of Thompson, Brown & Company, educational publishers. The latter firm is the oldest publisher of school textbooks in the country, having been organized in 1844 at Boston. The headquarters will hereafter be in New York. Mr. Lightner became connected with the Lord Manufacturing Company in 1912 as sales manager and secretary. In 1913 he became general manager and treasurer. He will continue to serve on the board of directors. C. W. Horne, who has been chief engineer of the company for the past year, has been made general manager. Mr. Horne was formerly engineer of tests for the Interborough Rapid Transit Company. He is president of the Horne & Crane Engine Company, whose automatic train stop and speed control device is being tested by the Central Railroad of New Jersey.

ADVERTISING LITERATURE

Roller-Smith Company, New York, N. Y., has issued a number of sheets describing its precision torsion balances for weighing lamp filaments and its various types of meters and circuit breakers.

Pelton Water Wheel Company, San Francisco, Cal., has issued a folder describing the individual features of the exhibit of hydraulic power apparatus and auxiliary equipment at the Panama-Pacific Exposition, San Francisco, Cal.

Standard Underground Cable Company, Pittsburgh, Pa., has issued a booklet entitled "Pointers on Telephone Cable Specifications." The booklet contains useful information regarding the size of conductor and sheath and type of sheath for various conditions, and directions for preparing specifications.

Pittsburgh High-Voltage Insulator Company, Pittsburgh, Pa., has issued a folder describing its high-voltage porcelain strain insulators of standard styles. These insulators are all free from metal parts and are not subject to strains set up by the use of metal expanding in greater proportion than the insulation.

Carnegie Steel Company, Pittsburgh, Pa., has issued the fifth edition of the Carnegie Shape Book. This book contains a complete list of all the products manufactured on the shape, plate, bar and rail mills of the Carnegie Steel Company with a few unimportant exceptions and is indicative of the variety of forms now made in rolled steel. A comparison of this edition with the fourth, issued in 1911, will show roughly the progress of the introduction of steel in varied lines within the past four years. Among the relatively new lines of manufacture will be noted very many new sash and casement sections, used in the construction of metal window panes, skylights, etc., and a large number of automobile sections together with a line of light weight beam sections distinguished from the American standard sections by the designation structural beams. The book is printed on special lightweight thin paper adopted by this company for publications of this kind and is attractively bound in green leather with gilt edges. Copies may be procured at the price of $1.

The Port Commission of Seattle, Wash., and the Ferry Line Auto Bus Company are negotiating for the establishment of jitney bus service in West Seattle in connection with the bay ferry steamers. The plans as proposed call for the operation of three large jitney buses. The agreement provides for a fare of 5 cents from Seattle across the bay to West Seattle by ferry, and by jitney bus to nearly every part of West Seattle, 2 cents of the fare to go to the Port Commission and 3 cents to the jitney bus company. The proposed buses would compete with the Alki Point and Fauntleroy lines of the Puget Sound Traction, Light & Power Company in West Seattle.

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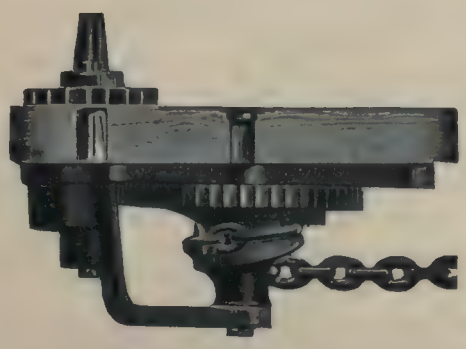

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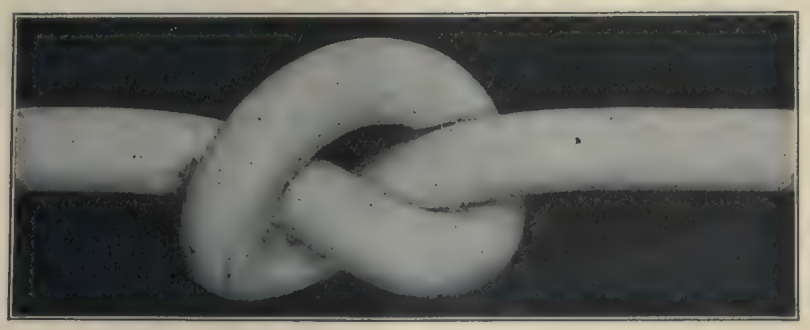

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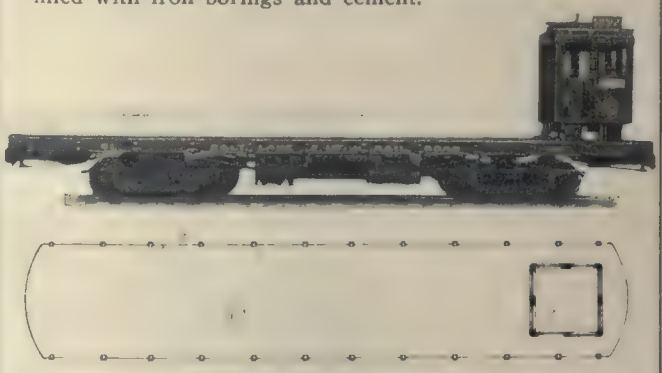

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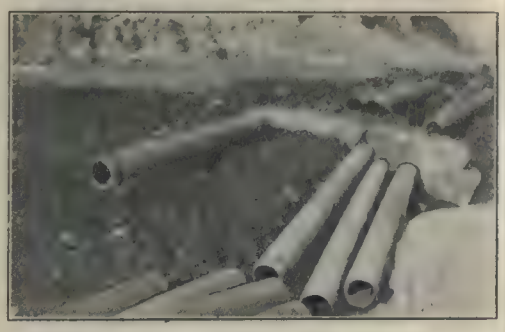

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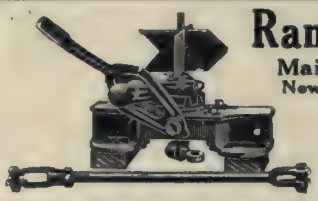

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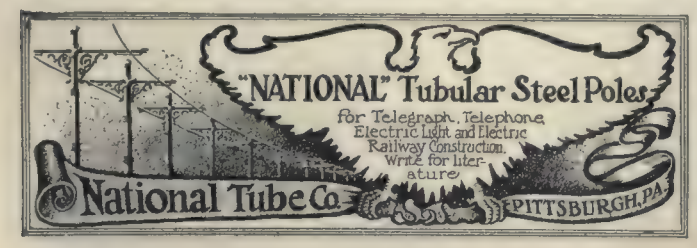

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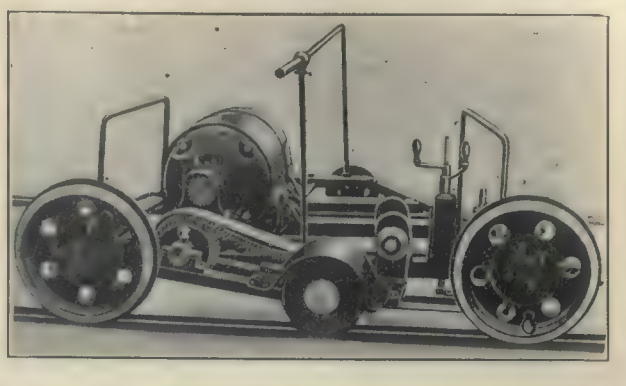

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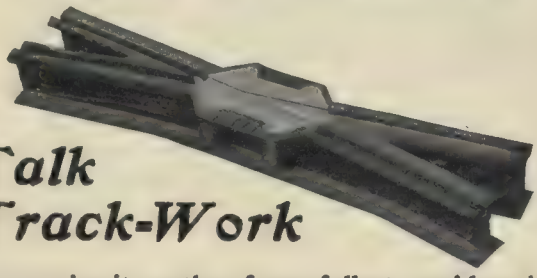

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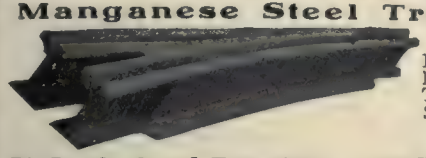

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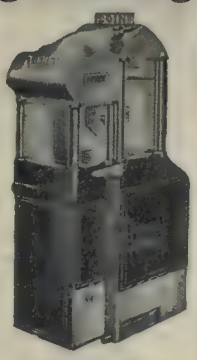

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Ventilation—Sanitation—Economy—Safety
All Combined in
THE COOPER FORCED VENTILATION HOT AIR HEATER
Patented September 30, 1913. Ask for the full story.
We Also Manufacture Pressed Steel Hot Water Heaters
THE COOPER HEATER CO., CARLISLE, PA.

SEARCHLIGHT SECTION

FOR SALE

1—Double Truck Sprinkling Car, 4000 gallons capacity.
25—Brill 20′ Closed Cars, G.E. 1000 Motors, Brill 21-E Truck.
15—Jones 20′ Closed Cars, G.E. 52 Motors, Bemis Trucks.
2—Jackson and Sharp 18′ Car Bodies.
2—28′ 10″ Paywithin Cars, 4 G.E. 80 Motors, Brill 27-G Trucks, AA1 Air Brakes.
8—42′ Kuhlman Interurban Cars, Baldwin Trucks, 4 West. 121 Motors.
15—Combination Interurban Cars, Baldwin Trucks, 4 West. 119 Motors.
5—Brill 22′ Closed Cars, West. 68 Motors, Peckham Trucks.
1—Jackson and Sharp 20′ Car Body.
3—Brill 30′ Express Cars, Brill 22-E Trucks.
9—Brill 30′ Express Cars, complete, 4 G.E. 1000 Motors, AA-1 Air Brakes, Brill 27-G Trucks.
8—Wason 10 bench open cars, G.E. 1000 Motors, Bemis Trucks.
5—Brill 10 bench open cars, West. 12-A Motors, Brill 21-E Trucks.
8—Brill 14 bench open cars, West. 56 Motors, Brill 22-E Trucks.
8—West. 101-B-2 Railway Motors, complete.
20—West. 12A Railway Motors, complete.
25—West. 49 Railway Motors, complete.
8—West. 38-B Railway Motors, complete.
8—West. 112 Railway Motors, complete.
4—West. 68-C Railway Motors, complete.
4—West. 68 Railway Motors, complete.
30—G.E. 90 Railway Motors, complete.
15—G.E. 66 Railway Motors, complete.
90—G.E. 88-B brand new Motors, complete.
10—G.E. 73 Railway Motors, complete.
20—G.E. 87 Railway Motors, complete.
20—G.E. 57 Railway Motors, complete.
15—G.E. 80 Railway Motors, complete.
15—G.E. 80 Armatures, brand new.
2—G.E. 87 Armatures, brand new.
2—G.E. 73-C Armatures, brand new. 20—K-14 Controllers.
4—G.E. 67 Armatures, brand new. 50—K-10 Controllers.
15—G.E. 57 Armatures (second hand) two turn.
20—G.E. 57 Form A motor casings.
3—West. 93-A-2 Armatures, brand new. 15—K-6 Controllers.
3—West. 101-B-2 Armatures, brand new.
3—West. 93-A Armatures, brand new. 25—B-29 Controllers
35—K-11 Controllers. 25—K-2 Controllers.
2—Sets Brill 27G Trucks, 4′ 6″ wheelbase.
6—Brill 21E Trucks, 7′ 6″ and 8′ wheelbase.
10—Dupont Trucks, 7′ 6″ wheelbase.

All of the above apparatus is in first class condition for immediate service. For further particulars apply to

W. R. KERSCHNER CO., Inc., 50 Church Street NEW YORK, N. Y.

MACGOVERN AND COMPANY
INC.

FRANK MACGOVERN, Pres. & Gen Mgr.

114 LIBERTY STREET NEW YORK CITY
'Phone, 3375-3376 Rector

60 CYCLE ROTARY CONVERTERS

1—300 KW. Westinghouse, 3 phase, 600 volts, D.C., 600 RPM., 500 amps., 370 volts AC., with starting motor.
1—100 KW. Gen. Elec., type TC, form A, 550 volts, 182 amps. DC., 340 volts AC., 1200 RPM.

25 CYCLE ROTARY CONVERTER

1—300 KW. Allis-Chalmers, 3 phase, 6 pole, 650 volts, 462 amps., 500 RPM.

Immediate Delivery

THIS IS OF NECESSITY ONLY A PARTIAL LIST—
SEND FOR CATALOG

HAROLD R. WILSON MACHINERY CO.
423 PINE STREET, ST. LOUIS
CARS OF ALL KINDS

Six complete motor cars like above cut, in excellent condition; each 42 feet 6 inches long; seat 50; 4 motors; complete in all details; will overhaul and repaint. Extremely low price as must move quickly.

WRITE FOR OUR NEW LIST

A C & D C UNITS—MOTORS—ROTARIES—ENGINES—BOILERS

COMPLETE ARMATURES FOR SALE
FOR ALL THE STANDARD
STREET RAILWAY MOTORS

GET OUR PRICE WE CAN SAVE YOU MONEY

America's Greatest Repair Works

CLEVELAND ARMATURE WORKS, Cleveland, O.

CARS FOR SALE
OPEN and CLOSED
MOTOR and TRAIL

Write for Price and Full Particulars to

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

Big Results from Little Ads

The advertisements in the Searchlight Section are constantly bringing together those who buy and sell, rent and lease or exchange. They convert idle commodities into useful cash, idle cash into useful commodities, and that which you have but don't want into that which you want but don't have. The cost is a trifle, the results considerable.

Get your Wants into the Searchlight

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RELAYS AND ANGLES

3 miles 45 lb. steel relays and angles, extra fine.
1 mile 52 lb. steel relays and angles, extra fine.
1 mile 60 lb. A. S. C. E., practically new.
10 miles 70 lb. steel relays and angles, extra fine.

ZELNICKER in St. Louis

RAILS MACHINERY EQUIPMENT

ARCHER & BALDWIN

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TELEPHONE 4337-4338 RECTOR

Rotary Converters, Alternating Dynamos,
Motor Generator Sets, Direct Current Dynamos,
Transformers, Alternating Motors
Railway Motors, Direct Current Motors,

ALSO ENGINES, BOILERS, CONDENSERS, HEATERS, ETC.

Send for catalogue giving complete list.

Do You Want a Salesman or Other Assistant?

If so, send us copy for a card under "Positions Vacant" in the Searchlight Section. The cost will be slight and the result will be both quick and satisfactory.

Get your Wants into the Searchlight

ELECTRIC RAILWAY JOURNAL, 239 West 39th St., New York

POSITIONS WANTED

ELECTRICAL engineer, technical graduate, 15 years' practical experience with General Electric, Westinghouse and public utility companies in engineering, construction and operation. Age 36, married; A-1 references. Box 773, Elec. Ry. Jour.

ELECTRICIAN and engineer, understanding steam engines, generators and rotaries. Sixteen years' experience. Address Box 797, Elec. Ry. Jour.

GENERAL auditor (34), wide and varied experience with following undertakings: Electric light and power, electric railways (city and interurban, passenger and freight, transcontinental railway, gas, hydro-electric and railway construction. Thoroughly conversant with Interstate Commerce Commission requirements. Arrangements made for special audits, examinations and installation of standard systems. Address Slaney, Box 64, Kerrisdale, Vancouver, British Columbia.

MASTER mechanic open for engagement; 18 years' experience. Well qualified to maintain and rebuild rolling equipment. Economic shop and successful labor manager. Highest grade references. Box 791, Elec. Ry. Jour.

STATION agent, experienced on steam and interurban roads, at present employed, desires better position. American and single. Can handle large stations to advantage. Freight station preferred. Box 790, Elec. Ry. Jour.

MANAGER, superintendent or chief engineer, by experienced man of executive ability, occupying similar positions with large corporation for over twenty years. Satisfactory records obtained and references furnished. Box 798, Elec. Ry. Jour.

Get your Wants into the Searchlight

ADVERTISING RATES

Positions Wanted, Evening Work Wanted, 2 cents a word, minimum charge 50 cents an insertion, payable in advance.

Positions Vacant, Salesmen Wanted, Agencies, all undisplayed Miscellaneous ads, Machinery and Plants For Sale (with one line of display heading), 3 cents a word, minimum charge $1.50 an insertion.

All advertisements for bids cost $2.40 an inch.

Advertisements in display type cost as follows for single insertions:

1-16 page, $5.00	1 in. single col., $3.00
1-8 page, 10.00	4 in. single col., 11.60
1-4 page, 20.00	8 in. single col., 22.40

In replying to advertisements, send copies of testimonials, etc., instead of originals.

POSITIONS WANTED

TECHNICAL graduate, electrical engineer, age 24, desires position as assistant superintendent of power and equipment or in railway engineering department. One year with Westinghouse, eight months in shops of large city railway. References. Box 795, Elec. Ry. Jour.

WANTED—A position as superintendent of track and ways or roadmaster, by a man, age 39 years, with 24 years' practical experience in all branches of steam, street and interurban railway construction and maintenance work. At present employed as roadmaster. Best of references. Desired change not compulsory. Box 777, Elec. Ry. Jour.

FOR SALE

Cable For Sale

24,000 feet 1,500,000 C. M. bear copper cable, 12,000 feet 500,000 C. M. ditto and 4000 feet 1,000,000 C. M. ditto, in approximate 500-feet lengths, and all in first class second-hand condition. Purchasing Department South Side Elevated Railroad Company, 1009 Royal Insurance Bldg., Chicago.

One 150-Ton WHEEL PRESS

One 150 H.P. Rice AUTOMATIC ENGINE

ZELNICKER in St. Louis

Get Your Wants into the Searchlight

Undisplayed Cards Under Positions Wanted Cost 50 Cents for 25 Words

Keep Your Eyes on the Journal's Searchlight Section

Machinery Advertisements Undisplayed Cost $1.50 for 50 Words

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Over 300 different products are here listed.

The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

Accountants.
Greims Corporation, H. E.

Acetylene Apparatus. (See Cutting Apparatus, Oxy-Acetylene.)

Acetylene Service.
Prest-O-Lite Co., Inc., The.
Searchlight Co., The.

Advertising, Street Car.
Collier, Inc., Barron G.

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Anchors, Guy.
Johns-Manville Co., H. W.
Westinghouse Elec. & M. Co.

Automobiles and Buses.
Brill Co., The J. G.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles.
Brill Co., The J. G.
Cambria Steel Co.
Cincinnati Car Co.
National Tube Co.
Niles Car & Mfg. Co.
Standard Steel Works Co.
U. S. Metal & Mfg. Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
American General Eng'g Co.
Columbia M. W. & M. I. Co.

Badges and Buttons.
International Register Co., The

Bankers and Brokers.
Halsey & Co., N. W.

Batteries, Dry.
Johns-Manville Co., H. W.

Batteries, Storage.
Electric Storage Battery Co.
Esterline Co.

Bearings, Center.
Baldwin Locomotive Works.

Bearings and Bearing Metals.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
Railway Specialties Corpn.

Bearings, Roller and Ball.
Hess-Bright Mfg. Co.
Railway Roller Bearing Co.
S. K. F. Ball Bearing Co.

Bells and Gongs.
Brill Co., The J. G.
Electric Service Supplies Co.
Ohio Signal Co.
Reiter, G. C.

Benders, Rail.
Niles-Bement-Pond Co.

Blow Torches for Soldering and Brazing. (See Cutting Apparatus, Oxy-Acetylene.)

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co.
Johns-Manville Co., H. W.

Boiler Coverings.
Johns-Manville Co., H. W.

Boiler Graphite.
Dixon Crucible Co., Joseph.

Boiler Tubes.
National Tube Co.

Boilers.
Babcock & Wilcox Co.

Bond Clips.
Electric Railway Improv. Co.

Bond Testers.
American Steel & Wire Co.

Bonding Apparatus.
Prest-O-Lite Co., Inc., The.
Searchlight Co., The.

Bonding Tools.
American Steel & Wire Co.
Electric Railway Improv. Co.
Electric Service Supplies Co.

Bonds, Rail.
American Steel & Wire Co.
Electric Railway Improv. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Roebling's Sons Co., John A.

Boring, Tools, Car Wheel.
Niles-Bement-Pond Co.

Braces, Rail.
Kilby Frog & Switch Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Piling and Lumber.)
Long Co., E. G.
Electric Service Supplies Co.
Lindsley Bros. Co.

Brake Shoes.
American Brake S. & Fdy. Co.
Barbour-Stockwell Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.
Railway Materials Co., The.

Brakes, Brake Systems and Brake Parts.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
National Brake Co.
U. S. Metal & Mfg. Co.
Westinghouse Traction Brake Co.

Brazing. (See Welding.)

Brushes, Carbon.
Calebaugh Self - Lubricating Carbon Co.
Dixon Crucible Co., Joseph.
General Electric Co.
Jeandron, W. J.
LeCarbone Co.
Morgan Crucible Co.
Westinghouse Elec. & M. Co.

Brush Holders.
Anderson Mfg. Co., A. & J. M.
Railway Specialties Corpn.

Bumpers, Car Seat.
Electric Service Supplies Co.
Imperial Rubber Co.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.

Bunting.
Boyle & Co., Inc., John.

Bushings, Fibre.
Diamond State Fibre Co.

Bushings, Rubber.
Imperial Rubber Co.

Bushings, Steel and Brass.
Railway Specialties Corpn.

Buttons. (See Badges and Buttons.)

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc., see those Headings.)

Car Trimmings. (For Curtains, Doors, Seats, etc., see those Headings.)

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Cincinnati Car Co.
Jewett Car Co.
Kuhlman Car Co., G. C.
Niles Car & Mfg. Co.
Wason Mfg. Co.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.

Castings, Composition or Copper.
Anderson M. Co., A. & J. M.

Castings, Gray Iron and Steel.
American B. S. & Fdry. Co.
American General Eng'g Co.
Columbia M. & W. & M. I. Co.
Falk Co.
Long Co., E. G.
St. Louis Steel Fdry.
Standard Steel Works Co.
Union Spring & Mfg. Co.

Castings, Malleable and Brass.
American B. S. & Fdry. Co.
American General Eng'g Co.
Long Co., E. G.

Catchers and Retrievers, Trolley.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Long Co., E. G.
Wood Co., C. N.

Ceiling, Car.
Pantasote Co.

Check Plates, Manganese Bronze.
Railway Specialties Corpn.

Cheese Cloth.
Boyle & Co., Inc., John.

Circuit Breakers.
Cutter Electrical & Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Clamps and Connectors, for Wires and Cables.
American General Eng'g Co.
Anderson M. Co., A. & J. M.
Electrical Engineers Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Klein & Sons, M.
Standard Railway Supply Co.
Westinghouse Elec. & M. Co.

Cleaners and Scrapers, Track. (See also Snow-Plows, Sweepers and Brooms.)
Brill Co., The J. G.
Cincinnati Car Co.

Cleats, Car Wiring.
General Electric Co.

Clusters and Sockets.
General Electric Co.

Coal and Ash Handling. (See Conveying and Hoisting Machinery.)

Coil Banding and Winding Machines.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Coil Impregnation.
Vacuum Impregnating Works.

Coils, Armature and Field.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Roebling's Sons Co., J. A.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines.
International Register Co., The
Johnson Fare Box Co.

That's Fine!

Our carbon brush cost has certainly gone down since we started using

Le Carbone

—The Uniform, Efficient, Reliable Carbon Brush.

W. J. Jeandron
173 Fulton Street, New York

Pittsburgh Office: 636 Wabash Bldg., W. P. Poynton, Engineer.
Chicago Office: 1657 Monadnock Block, J. C. Kyle, Engineer.

The Standard High-Grade Portable Instruments of the World!

Weston

Model 45 D. C. Portable Ammeters and Voltmeters

Designed to meet the demand for a medium-priced Ammeter and Voltmeter. They are guaranteed to be of sufficient accuracy (one per cent) for general testing in electric power plants, or for outdoor work.

They are shielded from the influence of external magnetic fields, the movement and magnetic system being enclosed in an iron case permanently mounted in a handsome wooden carrying-box with hinged cover.

The scale has a mirror over which the knife-edge pointer travels. Readings can be made within 1/10 of a division at any part of the scale.

In mechanical and electrical workmanship the Weston Model 45 Portable Ammeters and Voltmeters practically attain perfection.

A full description will be found in Bulletin 501, which will be mailed to you on request.

Weston Electrical Instrument Co.
21 Weston Ave., Newark, N. J.

New York	St. Louis	Cleveland	Toronto	Berlin
Chicago	Denver	Buffalo	Montreal	Paris
Philadelphia	San Francisco	Cincinnati	Winnipeg	London
Boston	Detroit	Richmond	Vancouver	Petrograd

TRADE **MORGANITE** MARK

Brushes

Prescribed—not merely sold.

The Morgan Crucible Co., Ltd.
120 Liberty St., New York
Factory Brooklyn

CALEBAUGH

No Spark Brushes

Save Commutators, Power, Brush Cost

ALEBAUGH SELF LUBRICATING CARBON COMPANY
1502 Columbia Ave. Phila., Pa.

PROVIDENCE FENDERS

H-B LIFE GUARDS

The Consolidated Car Fender Co., Providence, R. I.
Manufacturers of The Providence Fender and H-B Life Guard
Wendell & MacDuffie Co., 61 Broadway, New York
General Sales Agents

The Eclipse Railway Supply Co.
CLEVELAND, OHIO

Manufacturers of the

ECLIPSE LIFE GUARD — ECLIPSE WHEELGUARD
ECLIPSE TROLLEY RETRIEVER — ACME FENDER

GOLDEN GLOW

Railway Headlights
Used by 215 Railroads

See Our Full Page Advertisement in July 24th issue

The STERLINE Co.
Indianapolis

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Commutator Slotters.
American General Eng'g Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Wood Co., Chas. N.

Commutator Truing Devices.
American General Eng'g Co.
General Electric Co.

Commutators or Parts.
American General Eng'g Co.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
Westinghouse Elec. & M. Co.

Compressors, Air.
Curtis & Co. Mfg. Co.
General Electric Co.
Westinghouse Trac. Br. Co.

Condensers.
General Electric Co.
Westinghouse Machine Co.

Conduits, Flexible.
Fibre Conduit Co.
Tubular Woven Fabric Co.

Conduits, Underground.
Fibre Conduit Co.
Johns-Manville Co., H. W.

Controller Regulators.
Electric Service Supplies Co.

Controllers or Parts.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Kerschner Co., Inc., W. R.
Westinghouse Elec. & M. Co.

Controlling Systems.
General Electric Co.
Westinghouse Elec. & M. Co.

Converters, Rotary.
General Electric Co.
Westinghouse Elec. & M. Co.

Conveying and Hoisting Machinery.
Green Eng'g Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
Imperial Rubber Co.
International Register Co., The
Long Co., E. G.
Roebling's Sons Co., John A.
Samson Cordage Works.

Cord Connectors and Couplers.
Electric Service Supplies Co.
Samson Cordage Works.
Wood Co., Chas. N.

Cotton Duck.
Boyle & Co., Inc., John.

Couplers, Car.
Brill Co., The J. G.
Cincinnati Car Co.
Long Co., E. G.
Westinghouse Trac. Brake Co.

Cranes. (See also Hoists.)
Niles-Bement-Pond Co.
Thew Automatic Shovel Co.

Creosoting. (See Wood Preservatives.)

Cross Arms. (See Brackets.)

Crossing Signals. (See Signals, Crossing.)

Crossings, Track. (See Track, Special Work.)

Culverts.
Canton Culvert & Silo Co.

Curtains and Curtain Fixtures.
Brill Co., The J. G.
Electric Service Supplies Co.
Hartshorn Company, Stewart.
Pantasote Co., The.

Cushions, Field Coil.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.

Cutting Apparatus, Oxy-Acetylene.
Prest-O-Lite Co., Inc., The.
Searchlight Co., The.

Derailing Devices.
Cleveland Frog & Crossing Co.
U. S. Metal & Mfg. Co.

Despatching Systems.
Northey-Simmen Signal Co., Ltd.
Simmen Auto. Ry. Sig. Co.

Detective Service.
Wisch Service, P. Edward.

Door Operating Devices.
Electric Service Supplies Co.

Doors, Asbestos.
Johns-Manville Co., H. W.

Doors and Door Fixtures.
Brill Co., The J. G.
Electric Service Supplies Co.
Hale & Kilburn Co.

Doors, Folding Vestibule.
Electric Service Supplies Co.

Doors, Steel Rolling.
Kinnear Mfg. Co.

Draft Rigging. (See Couplers, Car.)

Drills, Track.
American Steel & Wire Co.
Electric Service Supplies Co.
Long Co., E. G.

Dryers and Purifiers, Oil. (See Purifiers and Dryers, Oil.)

Dryers, Sand.
Zelnicker Supply Co., W. A.

Engineers, Consulting, Contracting and Operating.
Archbold-Brady Co.
Arnold Co.
Bemis, Anthony J.
Byllesby & Co., H. M.
Ford, Bacon & Davis.
Greims Corporation, H. E.
Gulick-Henderson Co.
Hatch, E. G.
Hovey, M. H.
Hunt & Co., Robert W.
Jackson, D. C., & Wm. B.
Richey, Albert S.
Roosevelt & Thompson.
Sanderson & Porter.
Scofield Engineering Co.
Stone & Webster Eng'g Corp.
White Companies, J. G.
Woodmansee & Davidson, Inc.

Engines, Gas and Oil.
Westinghouse Machine Co.

Engines, Steam.
Westinghouse Machine Co.

Excavators.
General Engineering & Construction Co.

Fare Boxes.
American General Eng'g Co.
Brill Co., The J. G.
Dayton Fare Recorder Co.
International Register Co., The
Johnson Fare Box Co.

Fences, Woven Wire, and Fence Posts.
American Steel & Wire Co.

Fencing, Wire.
American Steel & Wire Co.

Fenders and Wheel Guards.
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Fender Co.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Parmenter F. & W. G. Co.
Star Brass Works.

Fibre.
Diamond State Fibre Co.
Westinghouse Elec. & M. Co.

Fibre Tubing.
Diamond State Fibre Co.
Fibre Conduit Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & M. Co.

Field Coils. (See Coils.)

Filters, Water.
Scaife & Sons Co., Wm. B.

Fire Extinguishing Apparatus.
Imperial Rubber Co.
Johns-Manville Co., H. W.
Pyrene Mfg. Co.

Fire-proofing Material.
Johns-Manville Co., H. W.

Fittings, Malleable, Cast Iron & Brass.
National Tube Co.

Flooring, Composition.
American Mason Safety T. Co.
Johns-Manville Co., H. W.

Forgings.
Standard Steel Works Co.

Furnaces. (See Stokers.)

Fuses and Fuse Boxes.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & M. Co.

Fuses, Refillable.
Columbia M. W. & M. I. Co.
General Electric Co.
Johns-Manville Co., H. W.

Gaskets.
Diamond State Fibre Co.
Imperial Rubber Co.
Johns-Manville Co., H. W.
Power Specialty Co.

Gas Producers.
Westinghouse Machine Co.

Gates, Car.
Brill Co., The J. G.
Cincinnati Car Co.
Jewett Car Co.

Gear Blanks.
Diamond State Fibre Co.
Standard Steel Wks. Co.

Gear Cases.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Kerschner Co., Inc., W. R.
Westinghouse Elec. & M. Co.

Gears and Pinions.
American Gen Eng'g Co.
Columbia M. W. & M. I. Co.
Diamond State Fibre Co.
Electric Service Supplies Co.
General Electric Co.
Kerschner Co., Inc., W. R.
Long Co., E. G.
Nuttall Co., R. D.

Generators, Alt.-Current.
General Electric Co.
Westinghouse Elec. & M. Co.

Generators, Dir.-Current.
General Electric Co.
Westinghouse Elec. & M. Co.

Gongs. (See Bells and Gongs.)

Gongs, Rotary Foot.
Reiter, G. C.

Graphite.
Dixon Crucible Co., Joseph.
Morgan Crucible Co.

Grates, Chain.
Green Engrg. Co.

Greases. (See Lubricants.)

Grinders, Portable, Electric.
General Electric Co.
Railway Track-work Co.
Seymour, E. P.

Guards, Trolley.
Electric Service Supplies Co.

Harps, Trolley.
American General Eng'g. Co.
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
Nuttall Co., R. D.
Star Brass Works.

Headlights.
Electric Service Supplies Co.
Esterline Co.
General Electric Co.
Long Co., E. G.
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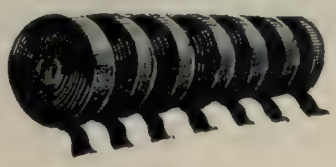

You'd say Goodbye to a great many insulating tapes long before that temperature was reached.

But until you reach that figure you can't put a kink into the insulating qualities of

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It is just the right "blend" of asbestos fibre and a special insulating compound.

Its particular value lies in the fact that while it is a good electrical insulator, it is also *a splendid conductor of heat.* Your coils can't stay blanketed when the temperature comes up.

Deltatape can be supplied in any width, and in thicknesses between 10 and 25 mils. The 10 mil tape requires 2500 volts to puncture it, while 5000 volts is required to break down the 25 mil tape.

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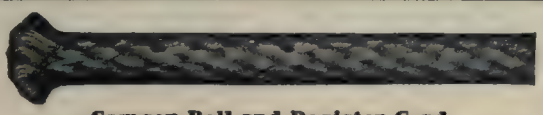

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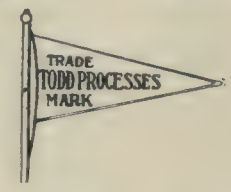

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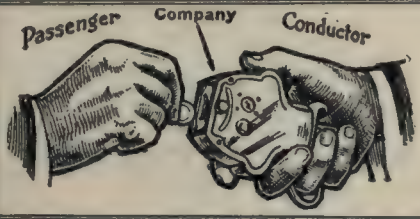

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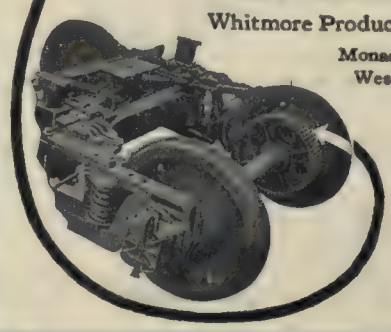

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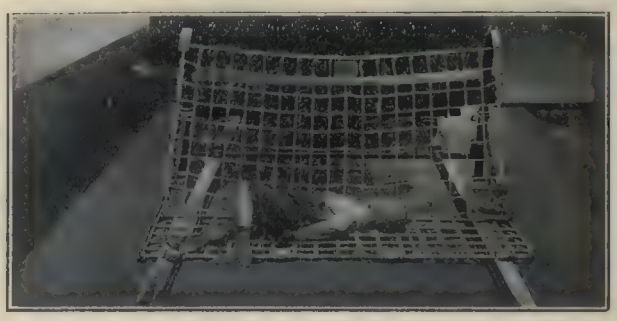

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FOR CAR HOUSES
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Heat Treated Motor Gearing

No. 2

Cost Ratio

On the assumption of 30,000 miles per year the Cast Steel Gear will last 3⅓ years, the "B P" 11⅔ years, and the Case Hardened 16⅔ years.

Items	Cast Steel	BP Grade	Case-hard-ened
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Compound interest at 6%, based upon relative life:			
3⅓ yr	2.70	....	....
11⅔ yr	..	17.85	....
16⅔ yr	..	....	41.20
Cost of installing	1.00	1.00	1.00
Total cost	$16.20	$37.60	$67.20
Cost per 1000 miles			
Standard grade	$0.162	....	....
BP Grade	..	$0.107	....
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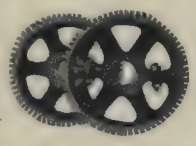

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NOTICE TO ADVERTISERS:

Printing begins on Tuesday of each week.
Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.
New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.
If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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—the answer to

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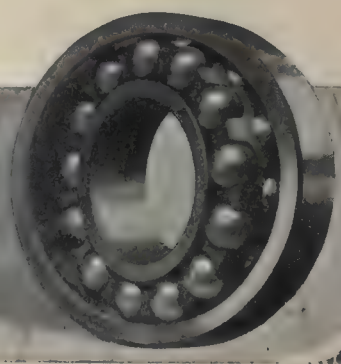

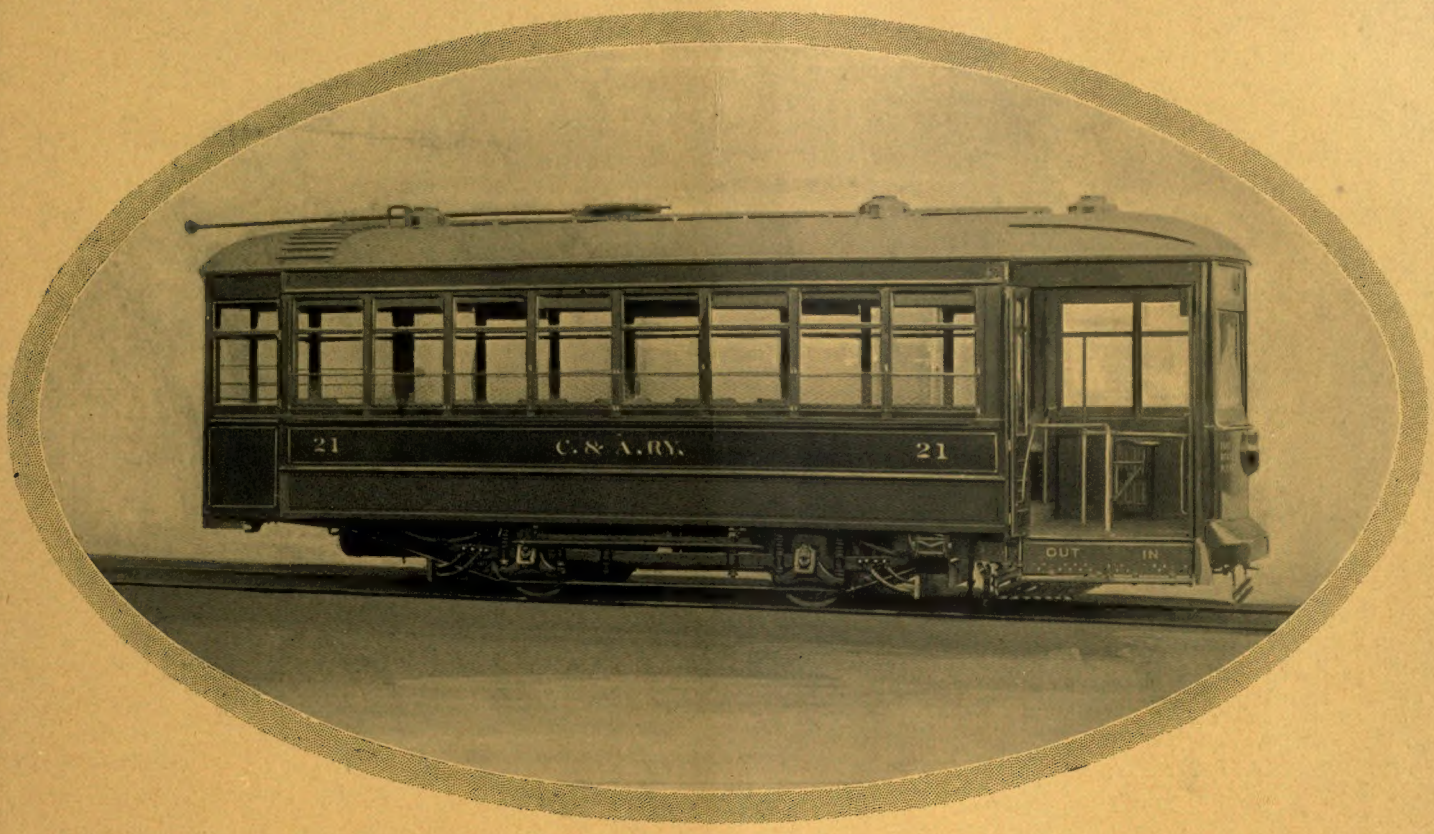

YOUR interest in single-truck cars is doubtless keen and you are closely watching the new developments in the direction of supplementing service with short, light cars on your own lines or for possible use later on; or if not applicable to your own service conditions you are interested in the proposition on general principles. At all events the single-truck car is under the spot light at present and demands attention. There is a considerable variation in single-truck car types—a wide range of structural designs, seating and platform plans. We have selected a representative number of these types, all built within the past year, and show them with floor plans and some interesting figures and data in a bulletin just published. If you wish a copy, ask for Bulletin No. 216.

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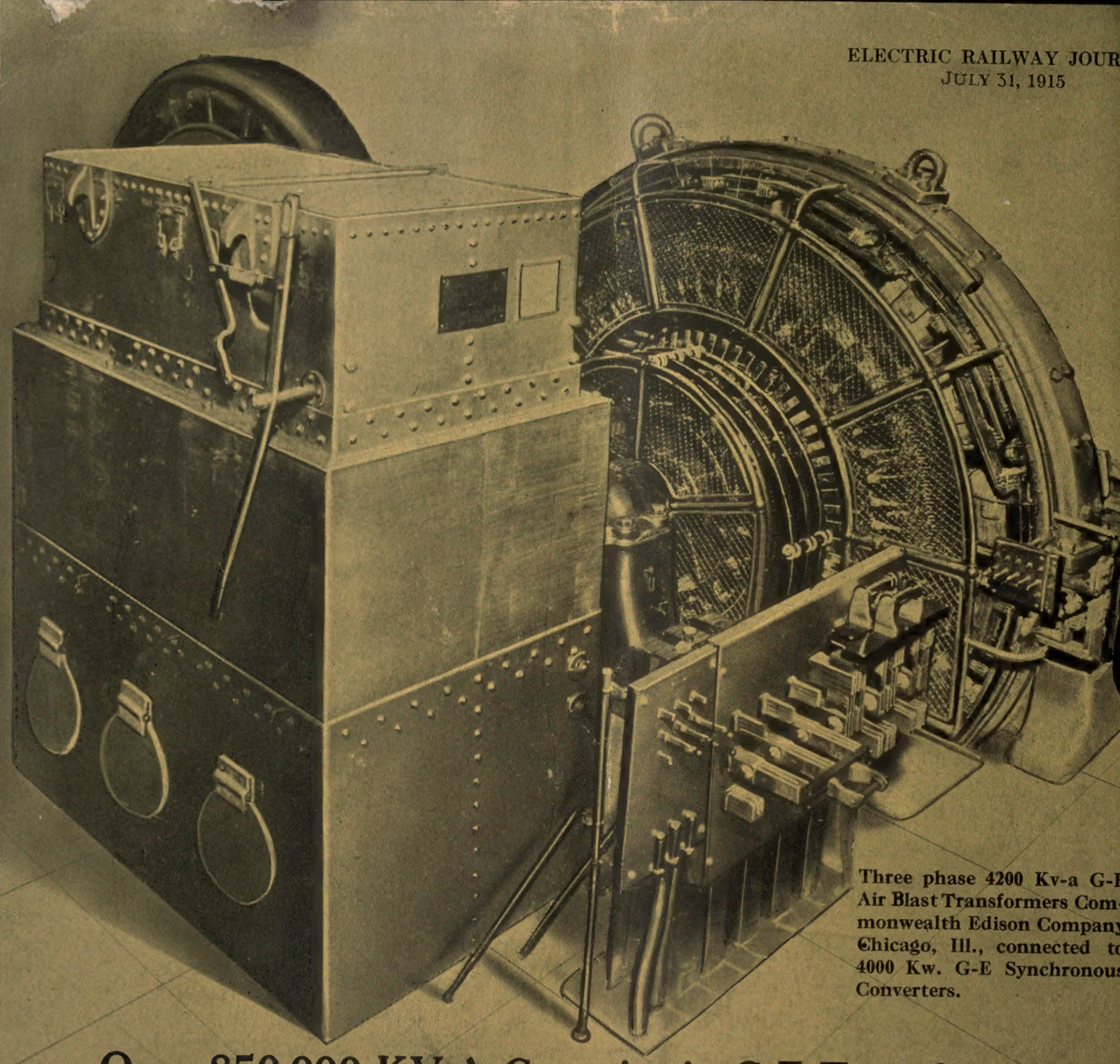

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Over 850,000 KV-A Capacity in G-E Transformers

have been furnished to date for operation with Synchronous Converters in railway service. These transformers are built in the oil insulated—self cooled, oil insulated—water cooled, and air-blast types.

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	No.	Kv-a	Voltage
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Chicago Surface Lines	10	4200	9000/445
Milwaukee Elec. Rwy. & Lt. Co.	1	3150	13200/445
Interborough Rapid Transit	7	1400	11000/460
International Rwy. Co.	1	1050	11000/430
Rhode Island Co.	4	1000	33000/11000
N. Y. C. & H. R. R. R.	6	735	11000/485
Boston Elevated Rwy.	6	700	13200/440
So. Traction Co.	1	550	60000/2300

In addition to the large number of transformers furnished for railway work, the General Electric Company has built and placed in successful operation transformers having capacities of 14,000 Kv-a and voltages as high as 150,000 in such notable installations as the Eastern Michigan Power Company, Pacific Light and Power Company, Hydro-Electric Power Commission, Canada, and the Mississippi River Power Company.

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